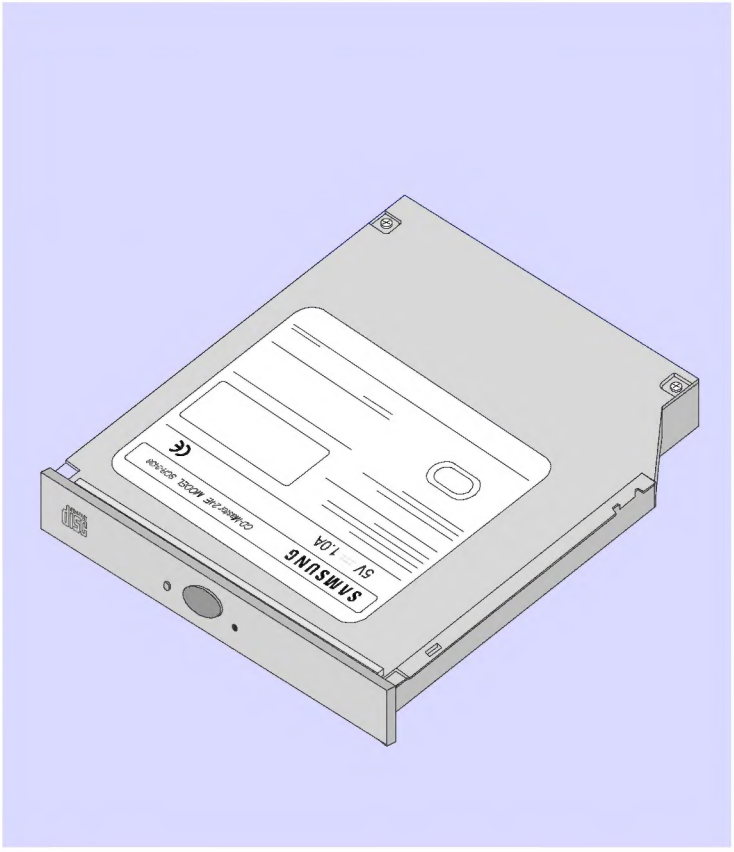
SAMSUNG

CD-ROM DRIVE
SCR-2438

CD-ROM SERVICE MANUAL

CD-ROM DRIVE



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1. Specifications

1. General Specifications

-Drive Type : Computer Built-in
-Power Consumption : DC+5V,1A
-Dimensions: 128mm(W)°ø12.7mm(H)°ø129mm(D)
-Weight: 0.3Kg
-Frequency Response : 20Hz~20KHz
-Signal to Noise Ratio : 70dB or more(1KHz, Lineout)-
Distortion Factor : 0.15£• or less(1KHz)
-Channel Separation : 60dB or more(1KHz)
-Laser Used: Semiconductor Laser

2. Electrical Feature

-Interface : ATAPI BUS(IDE)
-Data transfer Rate : MAX: 3,600KByte/Sec
Average: 1,800KByte/Sec
-ACCESS TIME: 1/3 stroke: 170ms or less
Full stroke: 300ms or less
-Buffer Capacity : 128Kbyte
-Error Ratio: Mode 1: Below 10^{-12}
Mode 2: Below 10

2. Cautions at Service

1.General Items

1)Be careful not to have eyes or a part of body touch with laser diode when servicing because this product uses laser diode.

2)Do not disassemble Pick-up when servicing. If the laser diode is damaged, replace the entire Mechanism.

3)Keep away from TV or other electrical appliances in other not to get influenced by them during servicing.

5) When you insert a disk into disk drive, be sure to load it correctly.

6)Because this unit can't be used on its own right, surely mount it on PC(486 or more) and check operating condition by using a suitable device driver floopy diskette. Refer to instructions manual for more information.

7)This unit consists of many parts whose features can affect on safety and importance indicated are specially given in circuit diagram and part list of crucial parts. Be certain to use the parts with same specifications when replacing these parts.

2. Earthing when handling Pick-up

- Because the laser diode in optical Pick-up Ass'y is subject to get out of order due to potential difference generated by static electricity charged in clothes or bodies, observe the following earthing items before servicing.

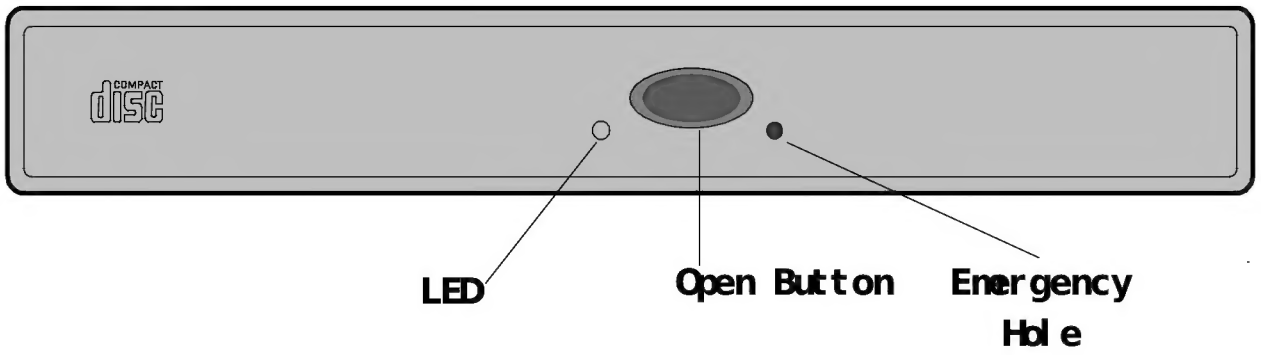
1) Earthing the static electricity in the body
Be sure to wear a grounding strap with one side earthed around your wrist.

2) Earthing the Work Table
Place the earthed conductive plate such as copper plate on the work table.

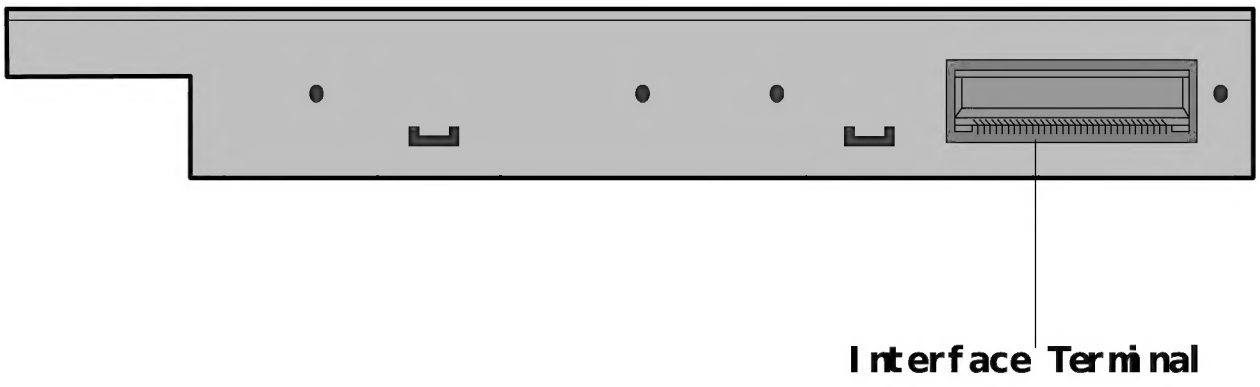
3)Cautions for clothes
Do not have any clothes touch with Pick-up because the static electricity in clothes can remain even after grounding

3. External Parts Name

(1).Front



(2). Rear



8. Disassembly Procedure

1. Disassembly the CASE-TOP
   1) Take off the 2 screws[1] on the top of the set.
   2) Lift up the case top[6].

2. Disassemble thd COVER-DECK and ASSY PANEL FRONT
   1) Next to EJECT the set, pull it to the front side and disassemble the 4 screws [2] in the reverse side.
   2) Disassemble the COVER-DECK[5].
   3) Disassemble the ASS'Y PANEL FRONT[21].

3. Disassemble the ASSY-SUB PCB
   1) Dismantle the whole FPC which is assemble in [24] ASSY-SUB PCB.
   2) Disassemble ASSY-SUB PCB[24].

4. Disassemble the ASSY-TRAY
   1) Disassemble the ASSY BRKT DECK.
   2) Push the RAIL-LEFT[4] and disassemble the ASSY CASE BOTTOM.
   3) Disassemble the ASSY-TRAY[7].

5. Disassemble the ASSY MAIN PCB
   1) Disassemble the FPC-MAIN[22] which is assembled in ASSY MAIN PCB[23].
   2) Disassemble the 3 screws and disassemble the ASSY MAIN PCB[23].

4. Main Components Block Diagram and Pin Descriptions

°< KS88C4404 MICROCONTROLLER

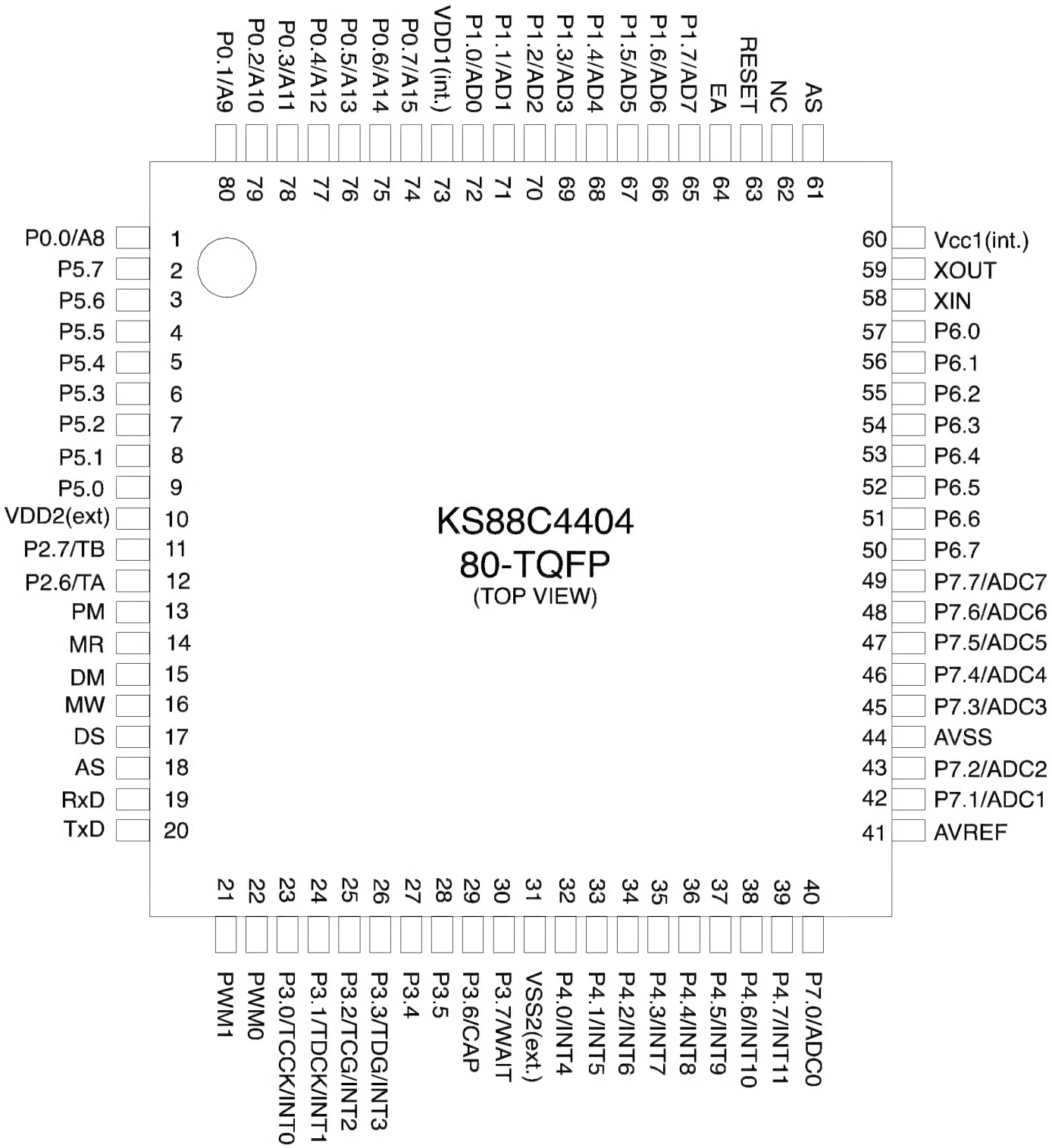


Figure 1-4. KS88C4404 Pin Assignments

°< BLOCK DIAGRAM KS88C4404

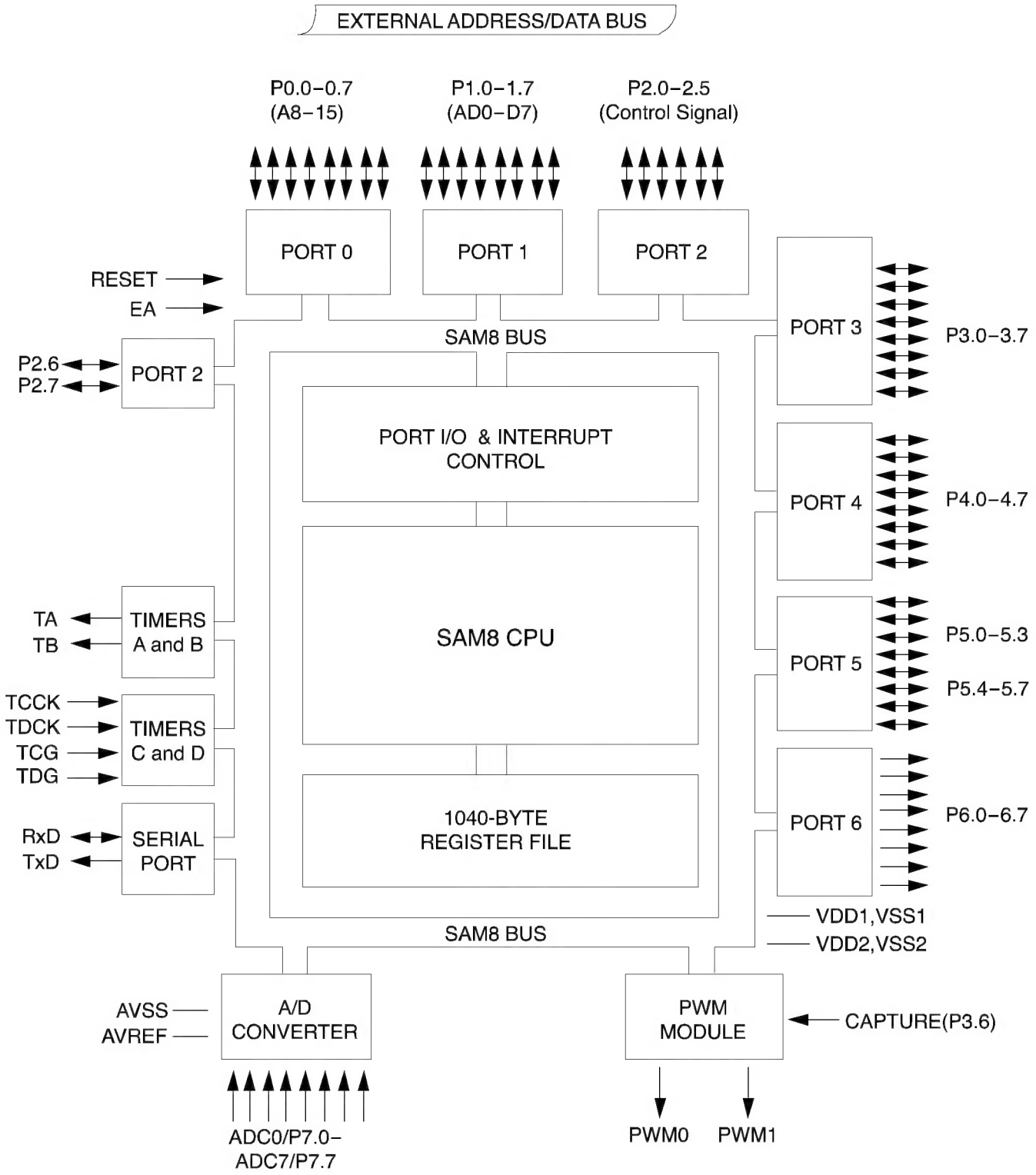
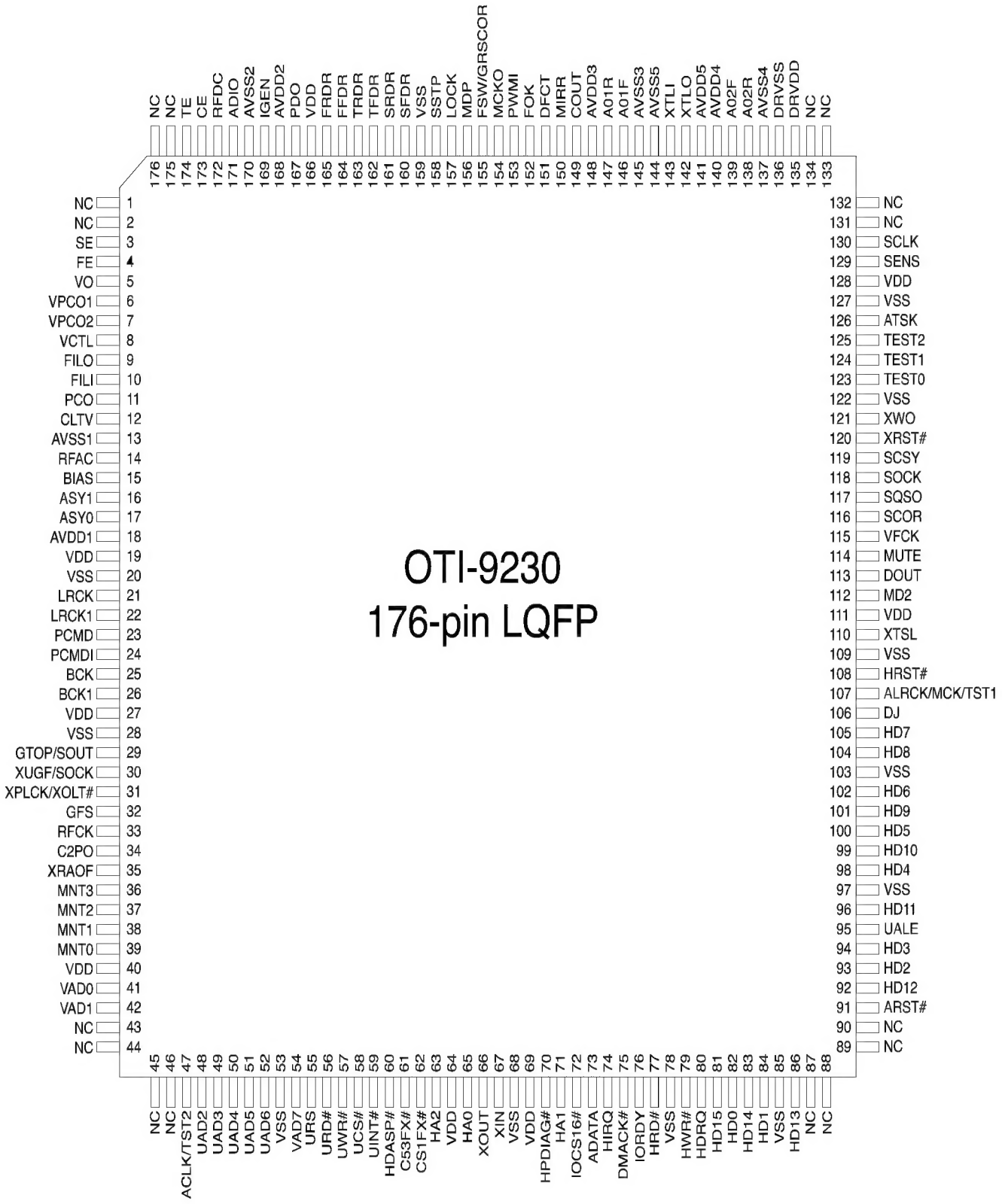


Figure 1-2. KS88C4404 Block Diagram

OTI-9230 PIN DESCRIPTIONS



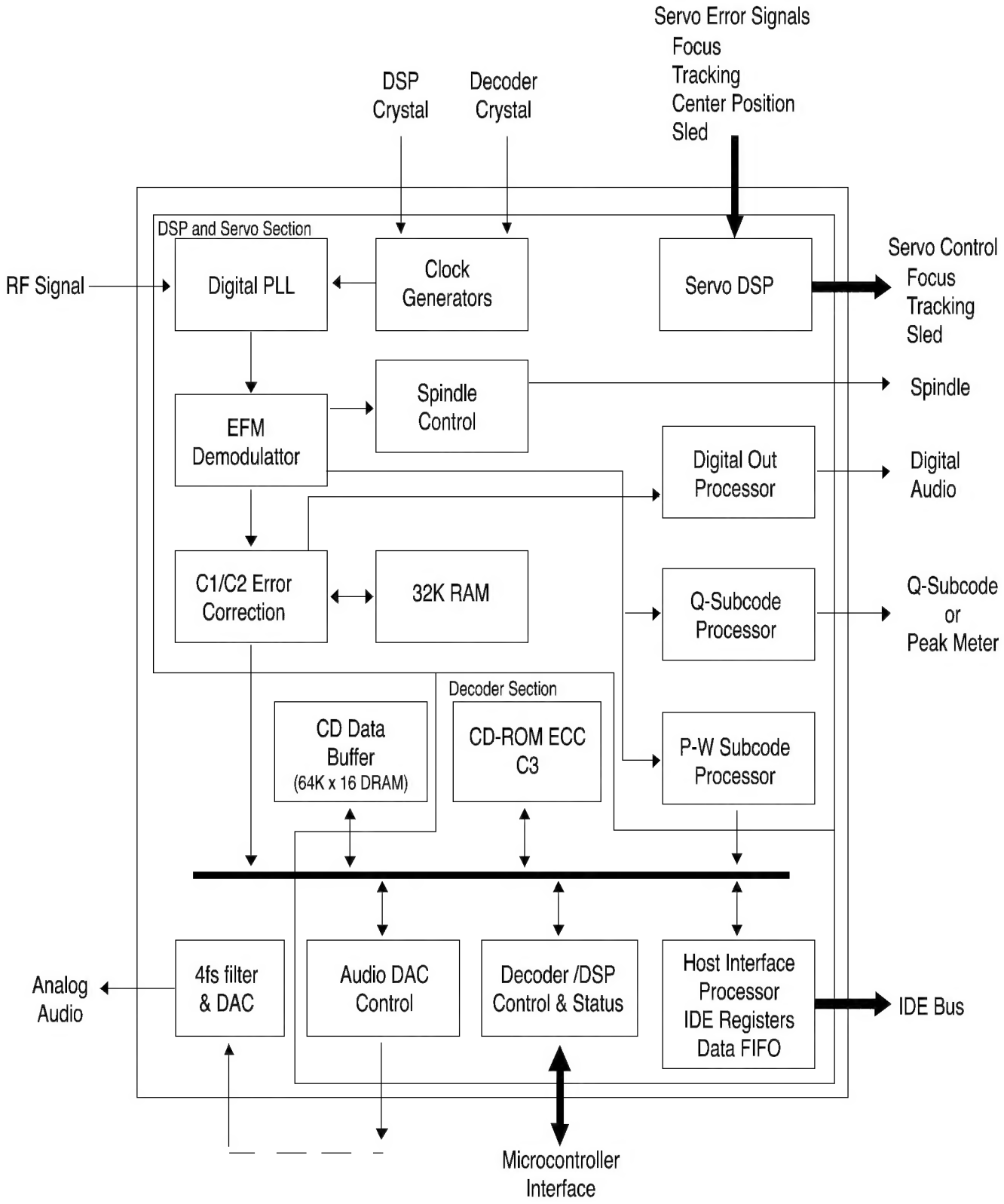


Figure 1-3. OTI-9230 Detailed Block Diagram

1. PIN-OUT ASSIGNMEN

Pin#	Pin Name	Pin Type	Comment	I_{OL} (mA)
1	NC			
2	NC			
3	SE	Ia	Sled error signal input	
4	FE	Ia	Focus error signal input	
5	VC	Ia	Center voltage input	
6	VPCO1	Ots	Wide-band EFM PLL VCO2 charge pump output1	
7	VPCO2	Ots	Wide-band EFM PLL VCO2 charge pump output2	
8	VCTL	Ia	Wide-band EFM PLL VCO2 charge pump input	
9	FILO	Oa	Master PLL filter output(slave=digital PLL)	
10	FILI	Ia	Master PLL filter input	
11	PCO	Ots	Master PLL charge pump output	
12	CLTV	Ia	Multiplier VCO control voltage input	
13	$AV_{SS}1$	PWR	Analog GND	
14	RFAC	Ia	EFM signal input	
15	BIAS	Ia	Asymmetry cicuit constant current input	
16	ASY1	Ia	Asymmetry comparator voltage input	
17	ASY0	O	EFM full-swing output(low=Vss, high=V_{DD})	
18	$AV_{DD}1$	PWR	Analog power supply	
19	V_{DD}	PWR	Digital power supply	
20	V_{SS}	PWR	Digital GND	
21	LRCK	O	Data LR clock output(48-bit slot, f=Fs)	
22	LRCK1	I	Digital audio LR clock input to DAC(48-bit slot)	
23	PCMD	O	Serial data output(48-bit slot)	
24	PCMD1	I	Digital Audio Data Input to DAC(48-Bit Slot)	
25	BCK	O	Serial Data Bit Clock Output(48-Bit Slot)	
26	BCK1	I	Digital Audio Bit Clock Input to DAC(48-Bit Slot)	
27	V_{DD}	PWR	Digital Power Supply	
28	V_{SS}	PWR	Digital GND	
29	GTOP/SOUT	O	Frame Sync Protection Status/Servo Serial Data Output	
30	XUGF/SOCK	O	Frame Sync Obtained from the EFM Signal/Servo Serial Data Bit Clock	
31	XPLCK/XOLT#	O	Inverse of the EFM PLL Clock/Servo Serial Data Latch	
32	GFS	O	High When the Frame Sync and Insertion Protection Timing Match	
33	RFCK	O	Frame Clock	
34	C2PO	O	Data Error Status	
35	XRAOR	O	Low When the 32K RAM Exceeds the-28F Jitter Margin	
36	MNT3	O	C1/C2 Error Correction Process Monitor	
37	MNT2	O		
38	MNT1	O		
39	MNT0	O		
40	V_{DD}	PWR	Digital power supply	
41	UAD0	I/Opu	Microcontroller Address/Data Bus	2 or 4(b)
42	UAD1	I/Opu		2 or 4(b)
43	NC			
44	NC			

PIN-OUT ASSIGNMENT(Cont'd)

Pin#	Pin Name	Pin Type	Comment	I_{OL} (mA)
4 5				
4 6				
4 7	ACLK/TST2	0	Audio Clock Out / Decoder Test 2 Out put	2
4 8	VAD2	I/O_{PU}	Microcontroller Address / Data Bus	2 or 4(b)
4 9	VAD3	I/O_{PU}		2 or 4(b)
5 0	VAD4	I/O_{PU}		2 or 4(b)
5 1	VAD5	I/O_{PU}		2 or 4(b)
52	VAD6	I/O_{PU}		2 or 4(b)
53	V_{SS}	PWR	Digital GND	
54	UAD7		Microcontroller Address / Data Bus	2 or 4(b)
55	URS	I_S	Microcontroller Register Select	
56	URD#	I_S	Microcontroller Read Strobe	
57	UNR#	I_S	Microcontroller Write Strobe	
58	UCS#	I_S	Microcontroller Chip Select	
59	UINT#	O_{PU}	Microcontroller Interrupt	4 or 8(b)
60	HDASP#	I/O_{PU}	IDE Host Interface	12
61	CS3FX#	I_S		
62	CS1FX#	I_S		
63	HA2	I_S		
64	V_{DD}	PWR	Digital Power Supply	
65	HA0	I_S	IDE Host Interface	
66	XOUT	O	Crytal Oscillator for Decider and IDE Host	
67	XIN	I_C	Interface	
68	V_{SS}	PWR	Digital GND	
69	V_{DD}	PWR	Digital Power Supply	
70	HPDIAG#	I/O_{od}	IDE Host Interface	12
71	HA1	I_S		
72	IOCS16#	O_{od}	16 Bit I/O on IDE Bus	24
73	ADATA	O	Digital Audio Data from Decoder	2
74	HIRQ	O_{ts}	Host Interrupt	24
75	DMACK#	$I_{s/pu}$	Host DMA ACKNOWLEDGE	
76	IORDY	O_{ts}	Host Read Strobe	24
77	HRD#	$I_{S/PU}$	Digital GND	
78	V_{SS}	PWR		
79	HWR#	$O_{S/PU}$	IDE Host Interface	
80	HDRQ	O_{ts}		12
81	HD15	I/O_{PU}	IDE Host Data Bus	4/8/12(a)
82	HDD	I/O_{PU}		4/8/12(a)
83	HD14	I/O_{PU}		4/8/12(a)
84	HD1	I/O_{PU}	IDE Host Data Bus	4/8/12(a)
85	V_{SS}	PWR	Digital GND	
86	HD13	I/O_{PU}	INE Host Data Bus	4/8/12(a)
87	NC			
88	NC			
89	NC			
90	NC			

PIN-OUT ASSIGNMENT(Cont'd)

Pin#	Pin Name	Pin Type	Comment	I_{OL} (mA)
91	ARST#	O_{od}	ATAPI Reset	8
92	HD12	I/O_{pu}	IDE Host Data Bus	4/8/12(a)
93	HD2	I/O_{pu}	IDE Host Data Bus	4/8/12(a)
94	HD3	I/O_{pu}		4/8/12(a)
95	UALE	Is	Microcontroller Address Latch Enable	
96	HD11	I/O_{pu}	IDE Host Data Bus	4/8/12(a)
97	V_{SS}	PWR	Digital GND	
98	HD4	I/O_{pu}	IDE Host Data Bus	4/8/12(a)
99	HD10	I/O_{pu}		4/8/12(a)
100	HD5	I/O_{pu}		4/8/12(a)
101	HD9	I/O_{pu}		4/8/12(a)
102	HD6	I/O_{pu}		4/8/12(a)
103	V_{SS}	PWR	Digital GND	
104	HD8	I/O_{pu}	IDE Host Data Bus	4/8/12(a)
105	HD7	I/O		4/8/12(a)
106	DJ	I	Master/Slave Drive Jumper	
107	ALRCK/MCK/TST1	O	Audio LR Clock/M Clock/Decoder Test Output	4
108	HRST#	Is	IDE Host Reset	
109	V_{SS}	PWR	Digital GND	
110	XTSL	I	DSP Crystal Selection Input	
111	V_{DD}	PWR	Digital Power Supply	
112	MD2	I	Consumer Digital Out Interface	
113	DOUT	O		
114	MUTE	I_s	Mute Control(Low=Off, High=On)	
115	WFCK	O	Writer Frame Clock Output	
116	SCOR	O	Subcode Sync Output	
117	SQSO	O	Subcode Q Data/PCM Level and Peak Data Interface	
118	SQCK	I_s		
119	SCSY	I_s	GRSCOR Re-Synchronization Input	
120	XRST#	I_s	Chip Reset	
121	XWO	I	DAC Sync Window Open Input	
122	V_{SS}	PWR	Digital GND	
123	TEST0	$I_{s/pd}$	Manufacturing Use Only	
124	TEST1	$I_{s/pd}$		
125	TEST2	$I_{s/pd}$		
126	ATSK	I	Shock Sensor Input	
127	V_{SS}	PWR	Digital GND	
128	V_{DD}	PWR	Digital Power Supply	
129	SENS	O_{ts}	Servo Status Serial Data Interface	
130	SCLK	I_s		
131	NC			
132	NC			
133	NC			
134	NC			
135	DRV_{DD}	PWR	Internal DRAM Power Supply	
136	DRV_{SS}	PWR	Internal DRAM GND	

PIN-OUT ASSIGNMENT(Cont'd)

Pin#	Pin Name	Pin Type	Comment	I_{OL} (mA)
137	$AV_{SS}4$	PWR	Analog GND for Channel 2	
138	A02R	O_{ts}	Channel 2(Right Channel)DAC PWM Output	
139	A02F	O_{ts}		
140	$AV_{DD}4$	PWR	Analog Power Supply for Channel 2	
141	$AV_{DD}5$	PWR	DSP/Servo Master Clock Power Supply	
142	XTL0	O	Crystal Oscilator for DSP/Servo Master Clock	
143	XTL1	I		
144	$AV_{SS}5$	PWR	DSP/Servo Master Clock GND	
145	$AV_{SS}3$	PWR	Analog GND for Channel 1	
146	A01F	O_{ts}	Channel 1(Left Channel)DAC PWM Output	
147	A01R	O_{ts}		
148	$AV_{DD}3$	PWR	Analog Power Supply for Channel 1	
149	COUT	I/O	Track Count Signal I/O	
150	MIRR	I/O	Mirror Signal I/O	
151	DFCT	I/O	Defect Signal I/O	
152	FOK	I/O	Focus OK Signal I/O	
153	PWMI	I	External Spindle Motor Control Input	
154	MCKO	O	Clock Output(Inverted Output of XTL1)	
155	FSW/GRSCOR	O	Spindle Motor Output Filter Control/Subcode Sync for Digital Audio Data	
156	MDP	O	Spindle Motor Servo Control	
157	LOCK	I/O	DSP Lock Signal I/O	
158	SSTP	I	Sled Stop Input	
159	V_{SS}	PWR	Digital GND	
160	SFDR	O	Sled Control PWM Output	
161	SRDR	O		
162	TFDR	O	Tracking Control PWM Output	
163	TRDR	O		
164	FFDR	O	Focus Control PWM Output	
165	FRDR	O		
166	V_{DD}	PWR	Digital Power Supply	
167	PDD	O_{ts}	Analog EFM PLL Charge Pump Output	
168	$AV_{DD}2$	PWR	Analog Power Supply	
169	IGEN	I_a	Current Source for Servo Op-Amp Reference Resistor	
170	$AV_{SS}2$	PWR	Analog GND	
171	ADI0	O_a	Servo Op-Amp Output Monitor	
172	RFDC	I_a	RF Signal Input	
173	CE	I_a	Center Servo Analog Input	
174	TE	I_a	Tracking Servo Error Signal Input	
175	NC			
176	NC			

Pin Types:

PWR Power
I Input TTL
I_a Input Analog
I_c Input CMOS
I_s Input Schmitt Trigger
$I_{s/pu}$ Input Schmitt Trigger/Pull-Up Resistor
$I_{s/pd}$ Input Schmitt Trigger/Pull-Down Resistor

O Output
O_{od} Output Open Drain
O_{pu} Output With Pull-up Resistor
O_{ts} Output Three State
$O_{pu/ts}$ Output with Pull-up Resistor/Three Sate
I/O_{pu} Bidirectional TTL With Pull-up Resistor

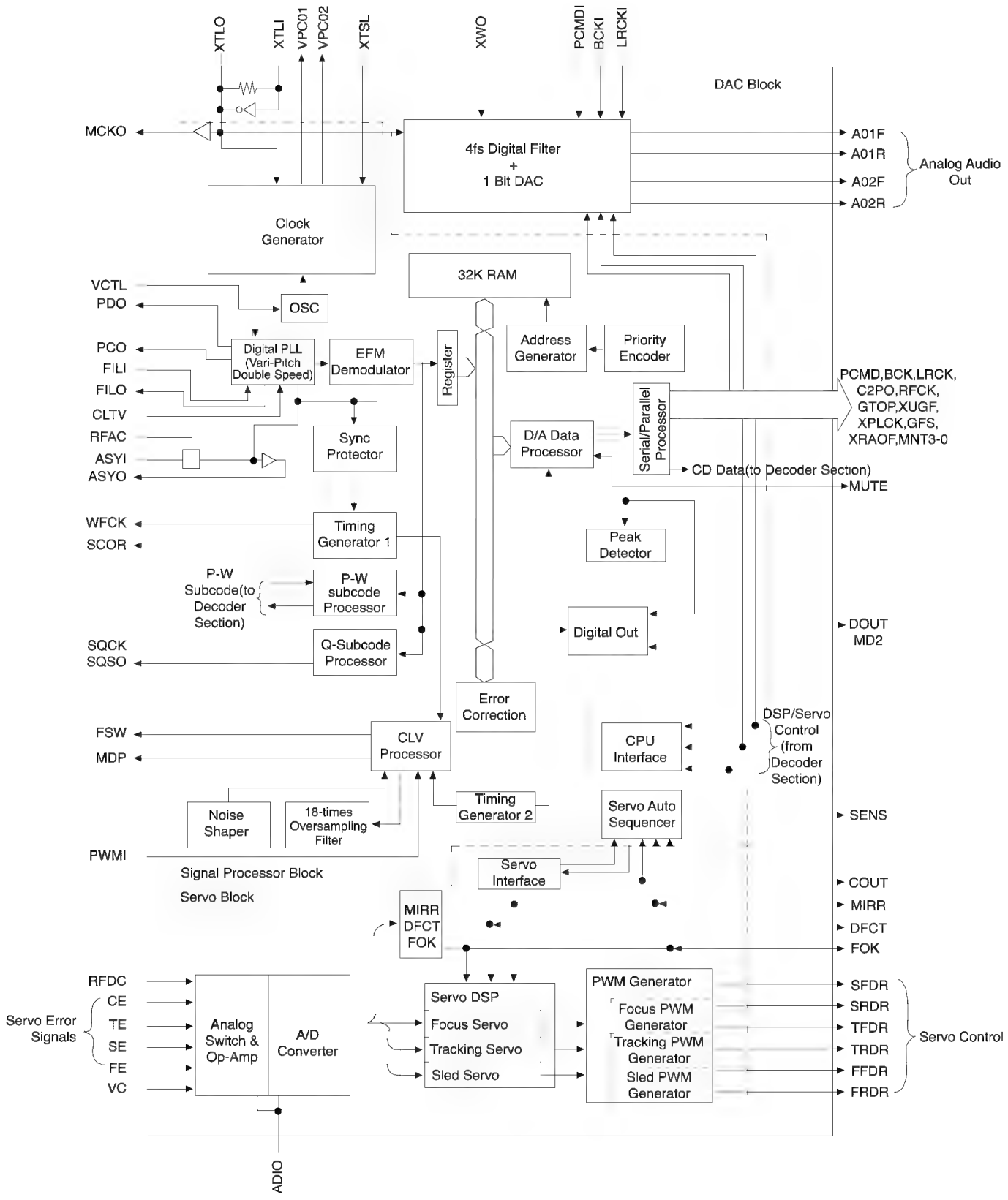
Programmable-IOL Pins:

Pins with IOL=a are Group-a Programmable-IOL pins, with sink current controlled by register PWR0 bits 5 and 4(microcontroller address B0h).
Pins with IOL=b are Group-b Programmable-IOL pins, with sink current cdontrolled by register PWR0 6 (microcontroller address B0h).

°< OTI 9230

BLOCK DIAGRAM OF DSP

1.6 DSP AND SERVO BLCK DIAGRAM



1.7 DECODER AND IDE INTERFACE BLOCK DIAGRAM

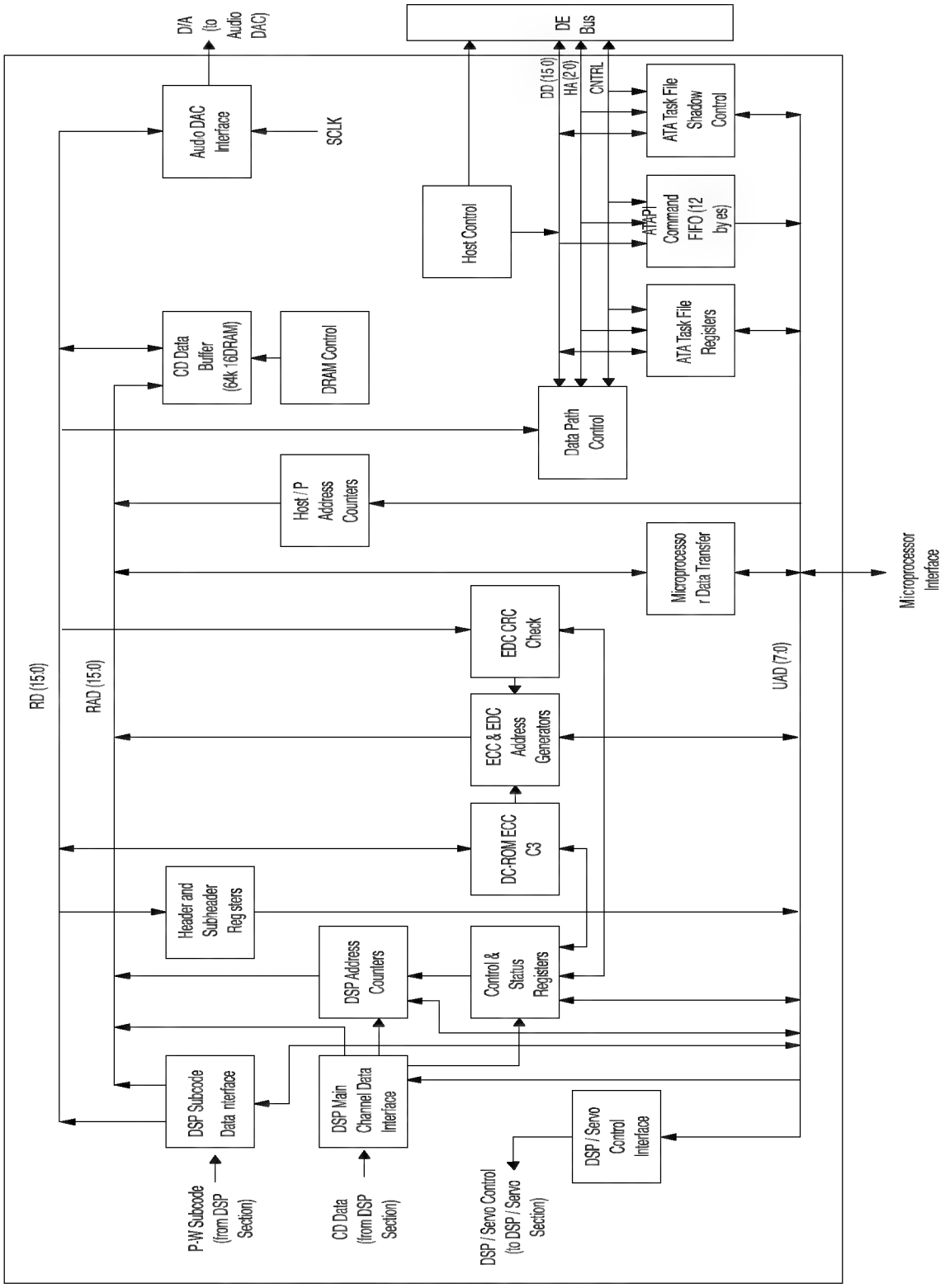
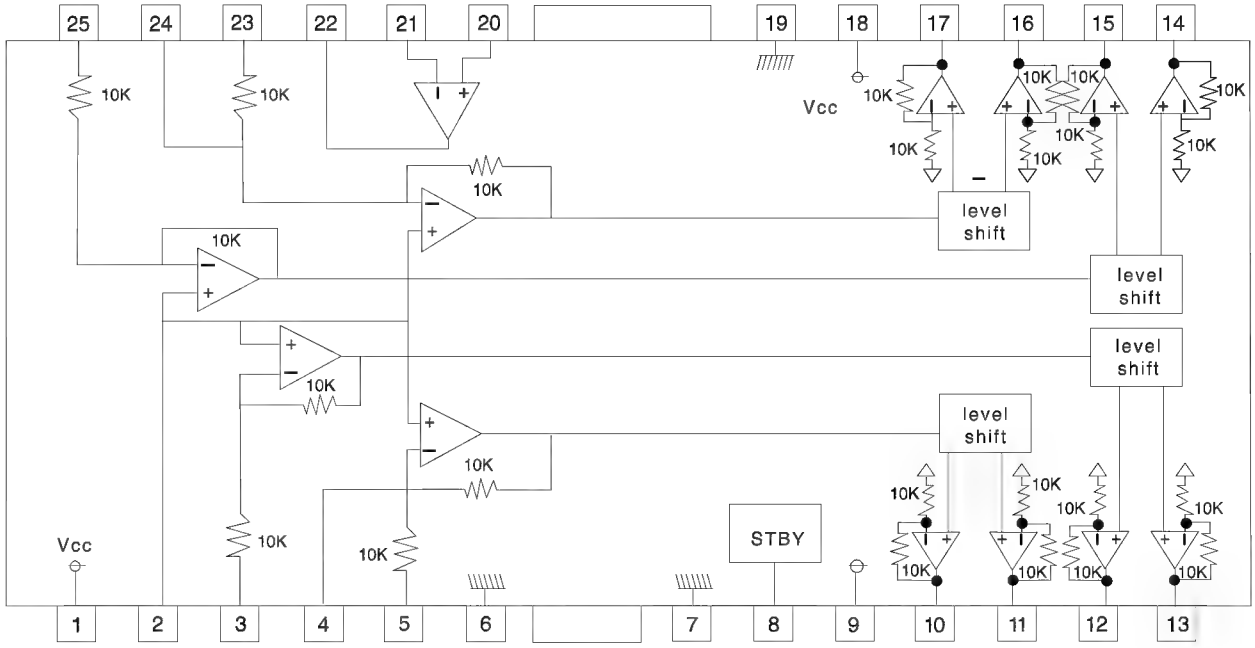


Figure 1-5: Detailed Block Diagram of Decoder and IDE Interface Sections

°< BA5918FP-Y
BLOCK DIAGRAM



T.S.D:Thermal shut down circuit
Unit for resistance value(ßÝ)

Figure 3

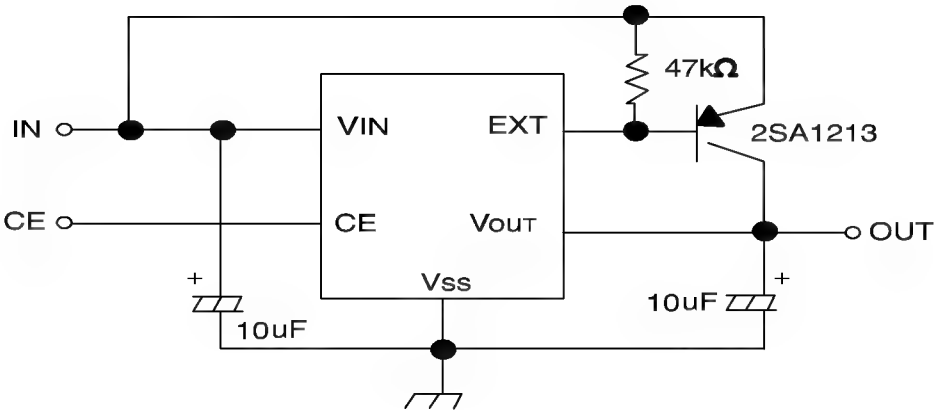
°< PIN DESCRIPTION

NO	Symbol	Description	NO	Symbol	Description
1	Vcc	Vcc	14	VO4(+)	Driver CH4 noninvrted output
2	BIAS IN	Bias amplifier input	15	VO4(-)	Driver CH4 inverted output
3	VIN1	Driver CH1 input	16	VO3(+)	Driver CH3 noninvrted output
4	VIN2	Driver CH2 input, gain adjustment pin	17	VO3(-)	Driver CH3 inverted output
5	VIN2	Driver CH2 input	18	Vcc	Vcc
6	GND	Substrate Ground	19	GND	Substrate Ground
7	GND	Substrate Ground	20	OP IN(+)	Op-amp input, positive
8	STBY	Input for stand-by control	21	OP IN(-)	Op-amp input, negative
9	Vcc	Vcc	22	OP OUT	Op-amp output
10	VO2(-)	Driver CH2 inverted output	23	VIN-3	Driver CH3 input
11	VO2(+)	Driver CH2 noninverted output	24	VIN-3	Driver CH3 input, gain adjustment pin
12	VO1(-)	Driver CH1 inverted output	25	VIN-4	Driver CH4 input
13	VO1(+)	Driver CH1 noninverted output			

°ÿ Symbol of-and(output of DRIVERS)means polarity to input pin.
(For example if voltage of pin3 is high, pin13 is high.)

°< Measurement Circuits

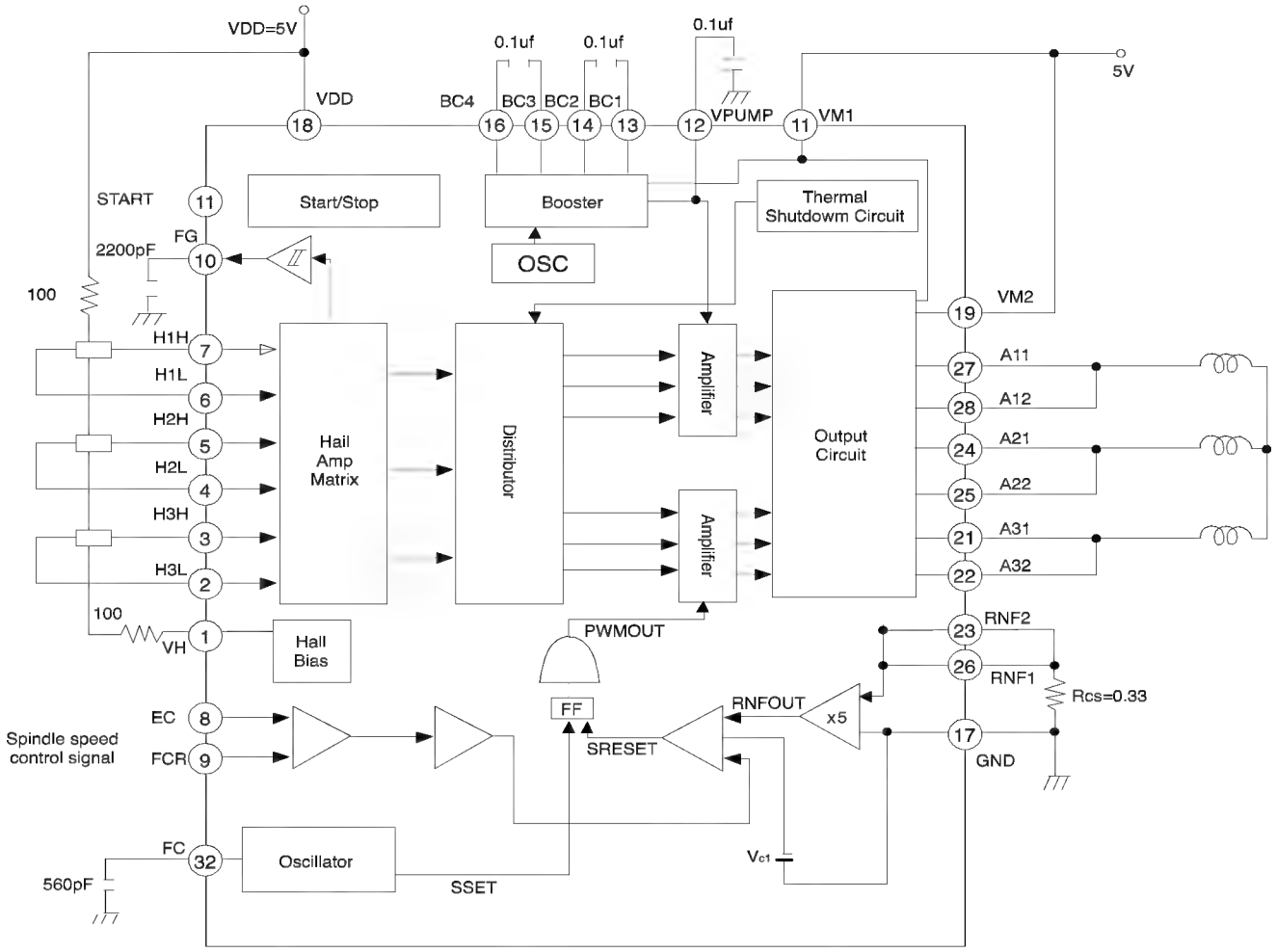
XC62EP3302MR



NOTE:

1. PNP Transistor
   The selection of the transistor should take into account output current, input voltage and power dissipation for the specific application.
   It is recommended to use a transistor that has low output saturated voltage (V_{CE})and high h_{FE} characteristics.

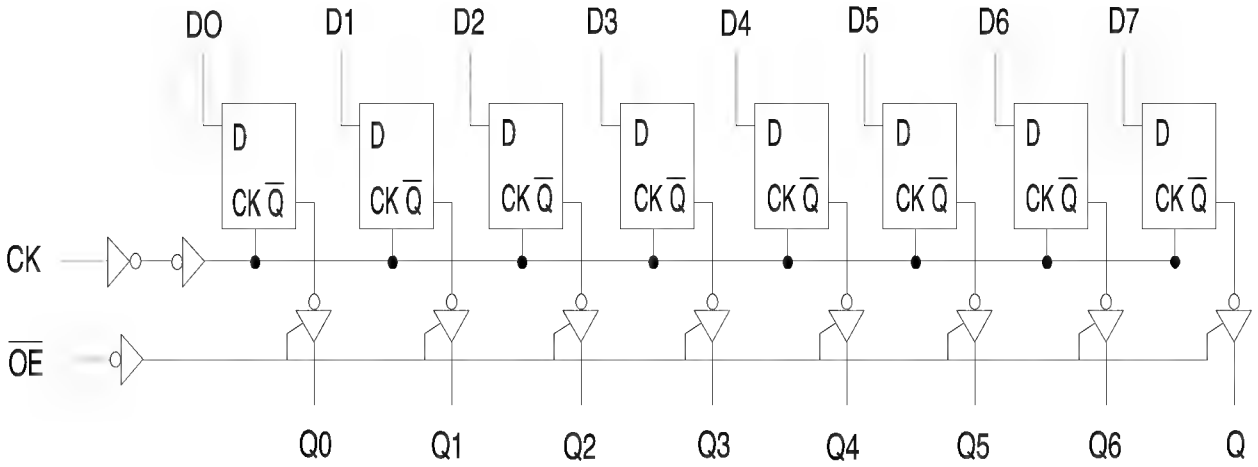
°< AN8472SN

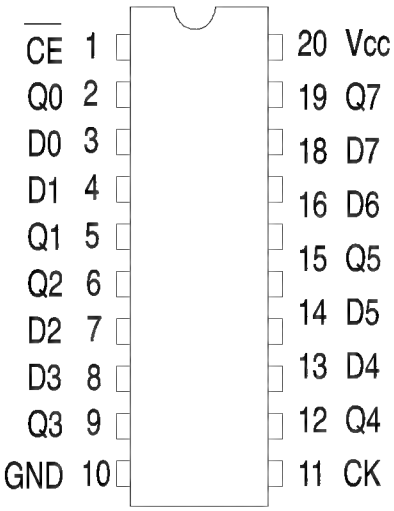


°< Pin Descriptions

Pin No.	Symbol	Function	Pin No.	Symbol	Function
1	V_H	Hall bias	17	GND	Ground
2	H3L	Hall element 3 negative input	18	V_{DD}	Power supply
3	H3H	Hall element 3 positive input	19	V_{M2}	Motor power supply2
4	H2L	Hall element 2 negative input	20	N.C.	Not connected
5	H2H	Hall element 2 positive input	21	A31	Drive output3
6	H1L	Hall element 1 negative input	22	A32	Drive output3
7	H1H	Hall element 1 positive input	23	RNF2	Current detection2
8	EC	Torque control input	24	A21	Drive output2
9	ECR	Torque control reference input	25	A22	Drive output2
10	FG	FG signal output	26	RNF1	Current detection1
11	START	Start/stop switching	27	A11	Drive output1
12	V_{PUMP}	Booster	28	A12	Drive output1
13	BC1	Booster capacitor connection1	29	N.C.	Not connected
14	BC2	Booster capacitor connection2	30	N.C.	Not connected
15	BC3	Booster capacitor connection3	31	V_{M1}	Motor power supply1
16	BC4	Booster capacitor connection4	32	FC	Oscillator

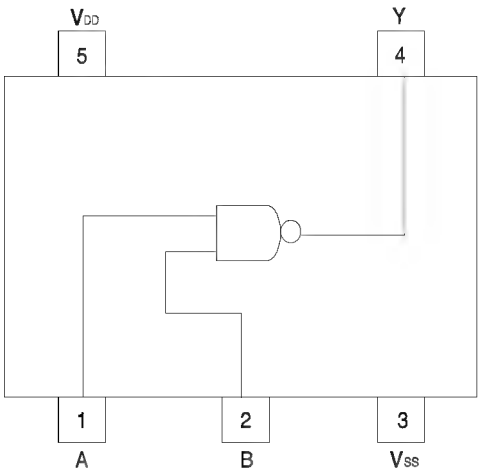
°< FLIP FLOP(TC74HC374A)





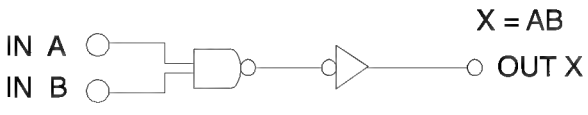
INPUTS			OUTPUTS
$\overline{OE}$	CK	D	
H	X	X	Z
L	↓	X	Q_N
L	↑	L	L
L	↑	H	H

°< BU4S11

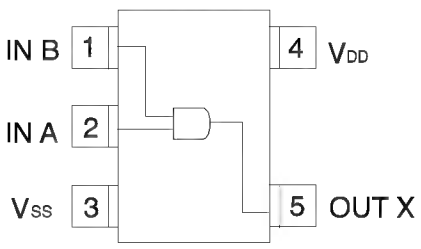


°< TC4S81F

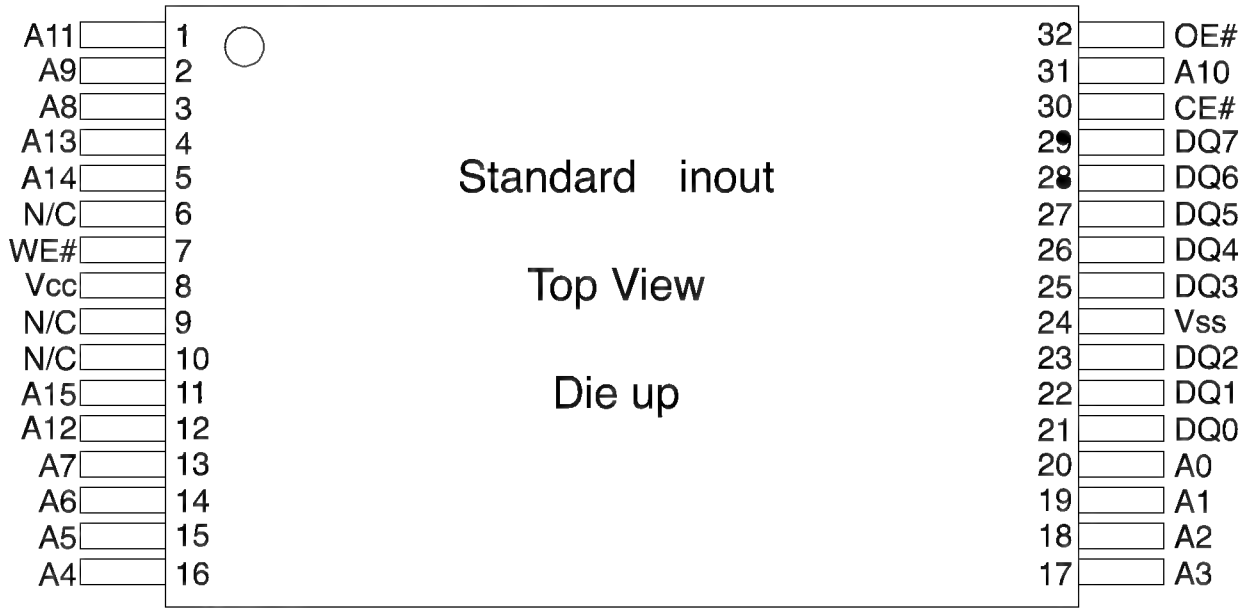
LOGIC DIAGRAM



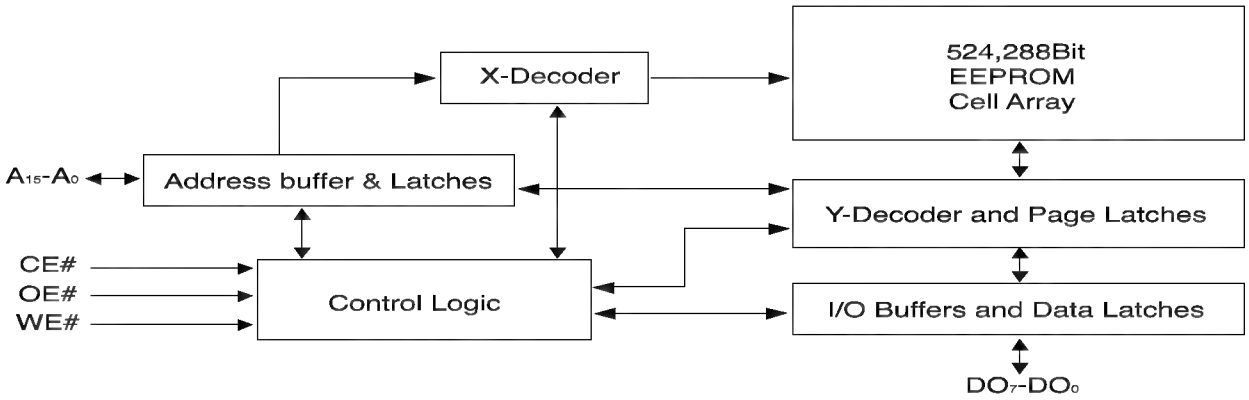
PIN CONFIGURATION (TOP VIEW)



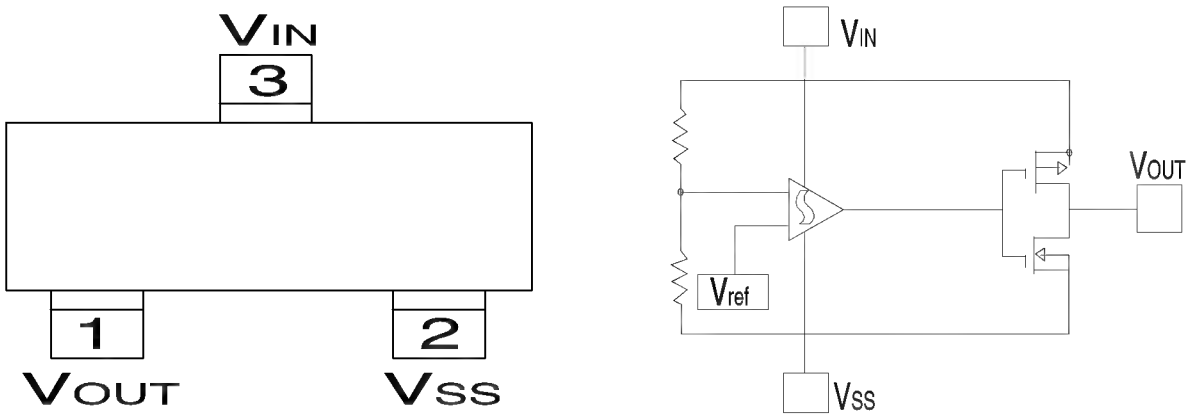
°< SST 29EE512(AT29C512)

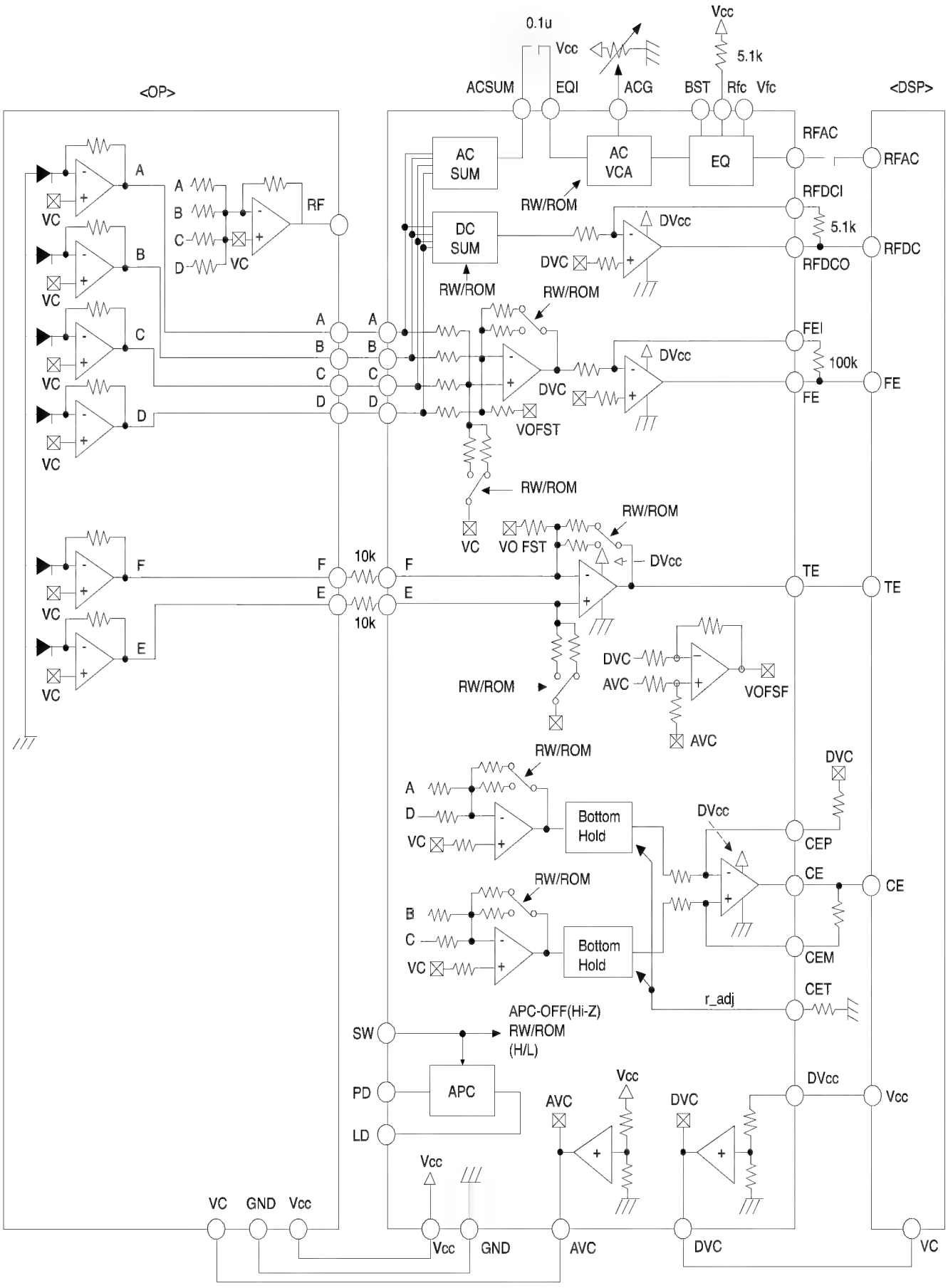


Functional Block diagram of SST 29EE512(AT29C512)

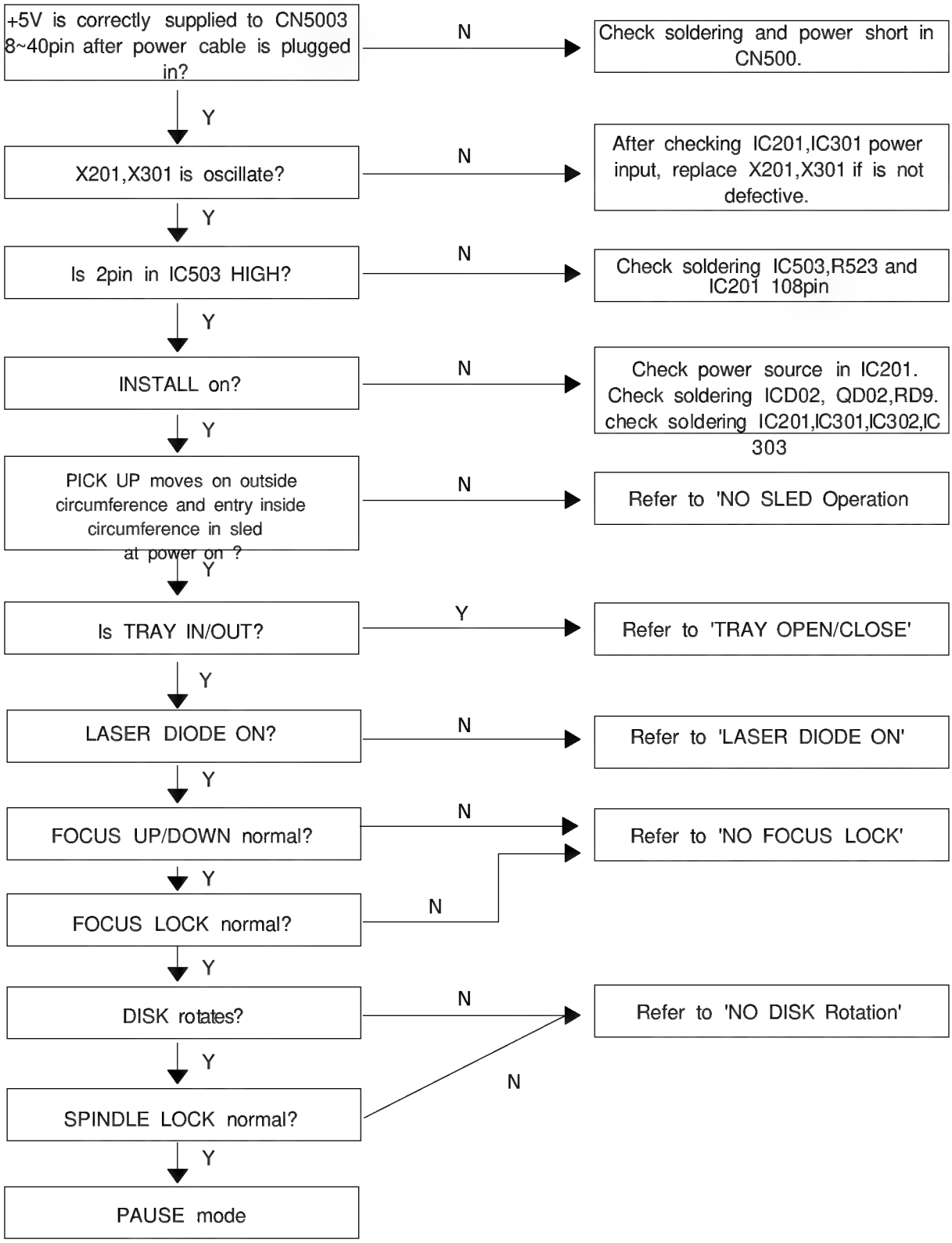


°< XC61AC3502



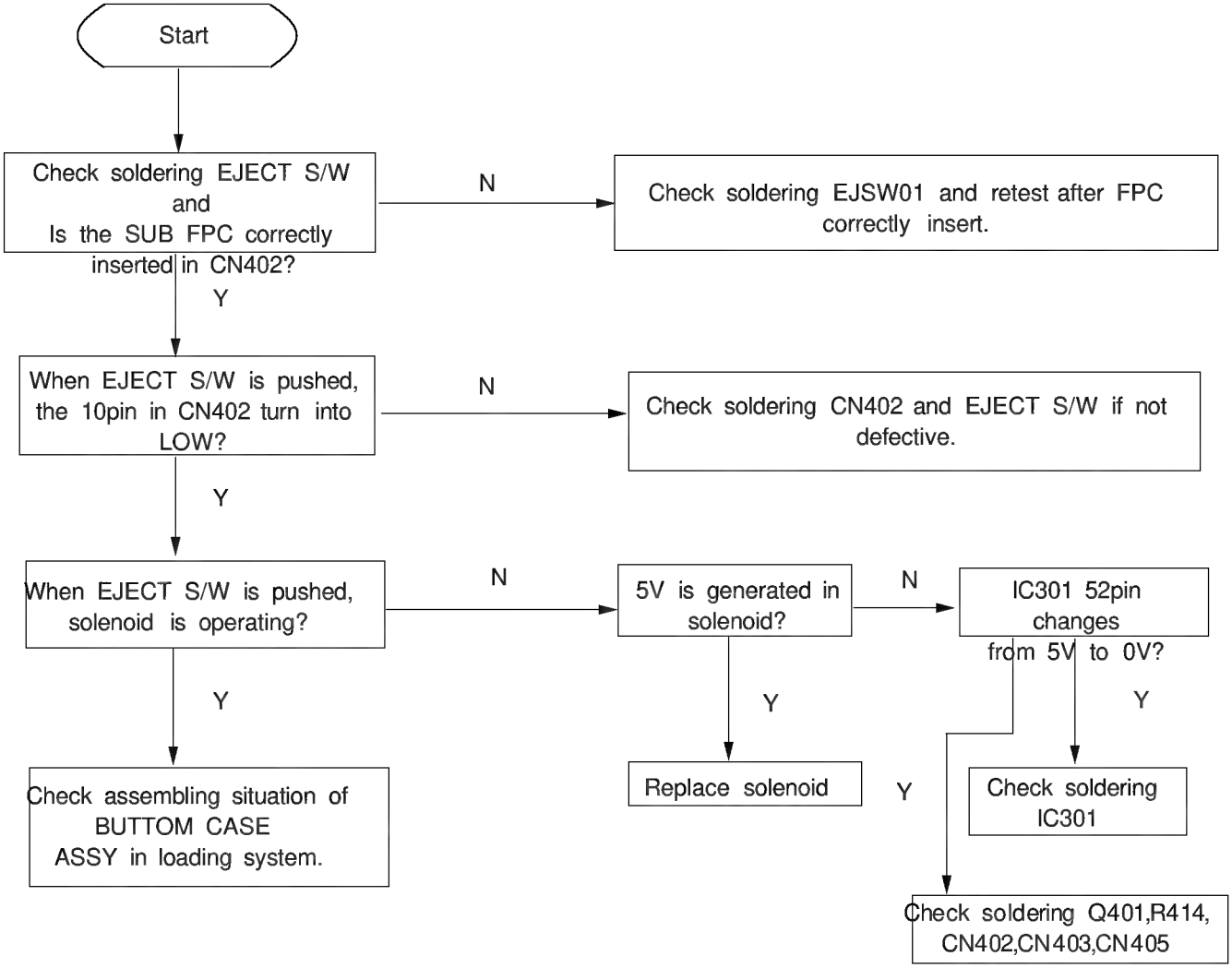

<OP>
<DSP>
0.1u
Vcc
5.1k
ACSUM
EQI
ACG
BST
Rfc
Vfc
AC SUM
AC VCA
EQ
RFAC
RFDCI
RFDC
RFDCO
DC SUM
RW/ROM
DVc
DVcc
FEI
FE
100k
VOFST
VO FST
TE
10k
DVC
AVC
VOFSF
Bottom Hold
CEP
CE
CEM
CET
r_adj
APC-OFF(Hi-Z)
RW/ROM
(H/L)
SW
PD
LD
APC
VC
GND
A
B
C
D
E
F
RF

9. Troubleshooting

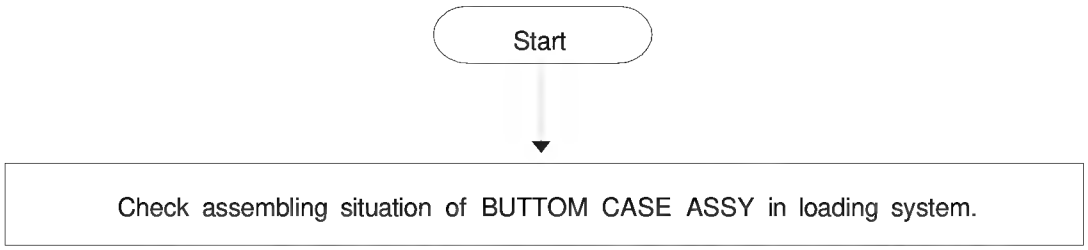


°ÿ. PAUSE mode : The state of continue 1 track back jump and LD ON with disk rotating.
°ÿ. Check soldering and power source at related IC before troubleshooting.

9-1. No Tray Open operation


Start
Check soldering EJECT S/W and Is the SUB FPC correctly inserted in CN402?
N
Check soldering EJSW01 and retest after FPC correctly insert.
Y
When EJECT S/W is pushed, the 10pin in CN402 turn into LOW?
N
Check soldering CN402 and EJECT S/W if not defective.
Y
When EJECT S/W is pushed, solenoid is operating?
N
5V is generated in solenoid?
N
IC301 52pin changes from 5V to 0V?
Y
Y
Y
Check assembling situation of BUTTOM CASE ASSY in loading system.
Replace solenoid
Y
Check soldering IC301
Check soldering Q401,R414, CN402,CN403,CN405

9-2. No Tray Close Operation



9-3. No Laser Diode On

Start

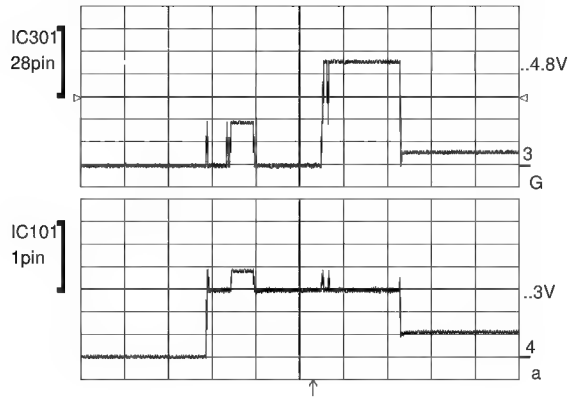
Check soldering SW301.

Power on under closing condition of TRAY.

At first POWER ON, IC301 28pin and IC101 1pin show waveform as lower figure?

N

Check soldering IC101, IC301,CN403,CN405



Y

Check soldering CN101,Q101,L101, R101,CE101,C102

Y

Check connection ACTUATOR in P/U

Y

Replace PICK UP(DECK)

9-4. No Sled Operation

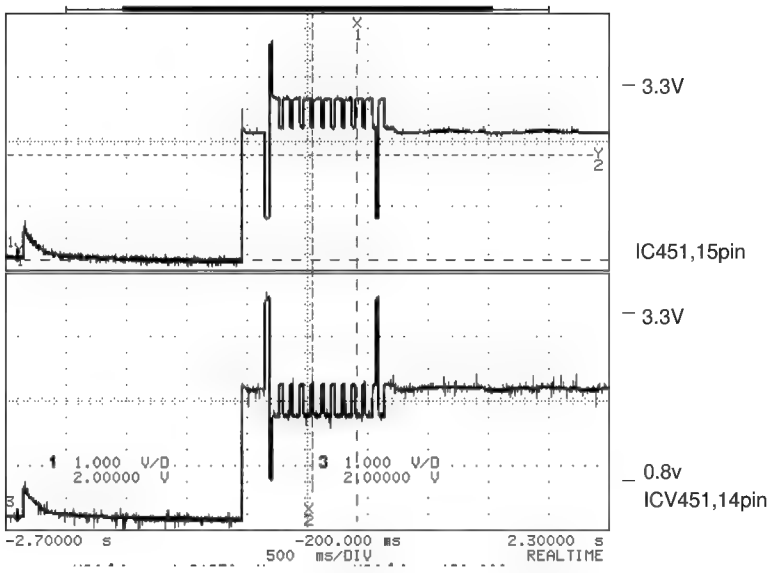
Start

Move PICK-UP to out.

PICK UP moves to inmost track when power on?

Output in IC451 14,15PIN show as in figure?

Check power source in IC451,IC201.
Check soldering in IC201¿« 160,161pin.
Check soldering in C455,R458,R459,R460.



SLED MOTOR +,- terminals show waveform as in figure?

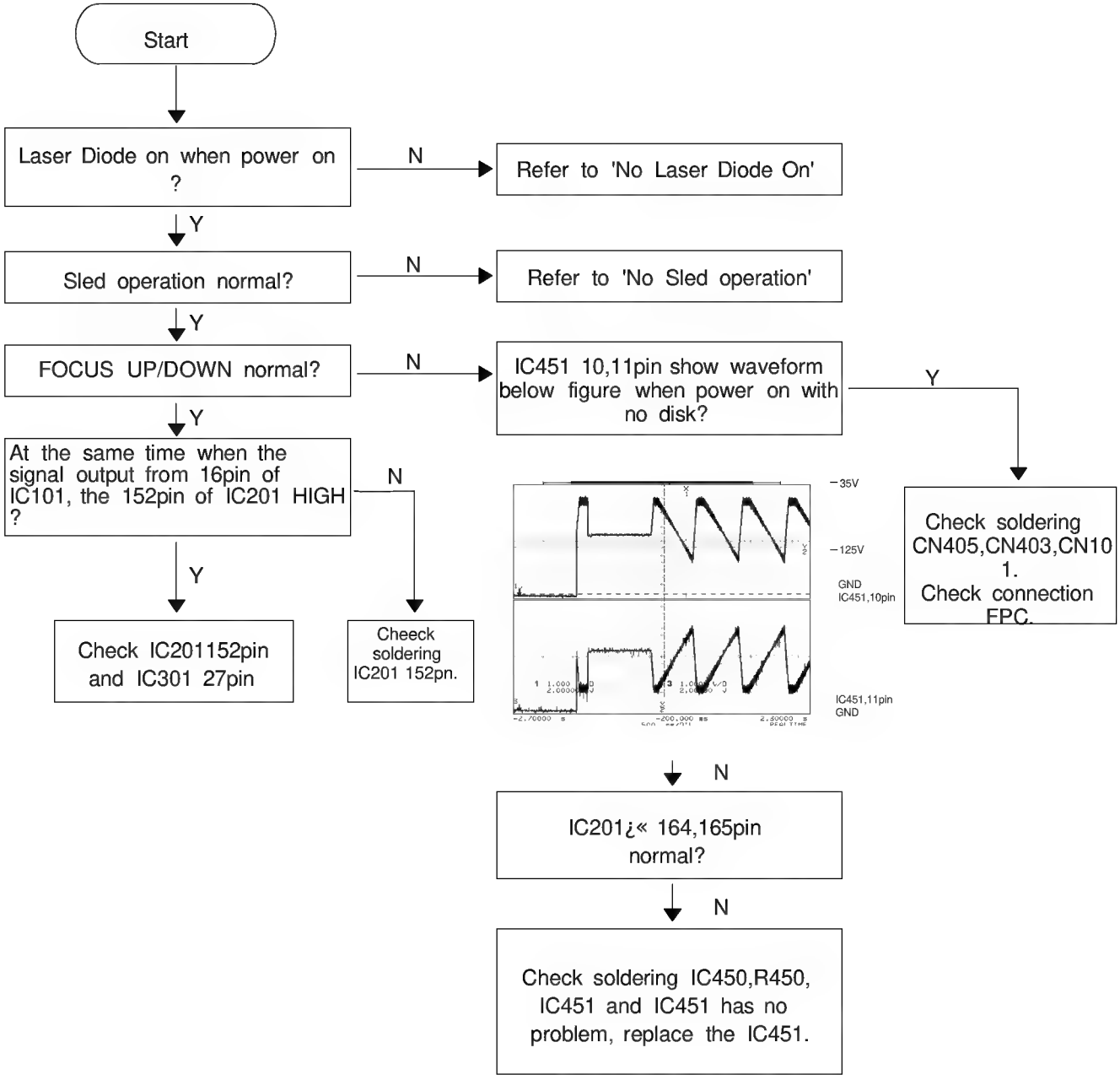
Check soldering in CN405,CN403,CN402
Check connection of FPC on SLED

Is SLED GEAR normal?
Are there no alien substance on power transmission equipment?

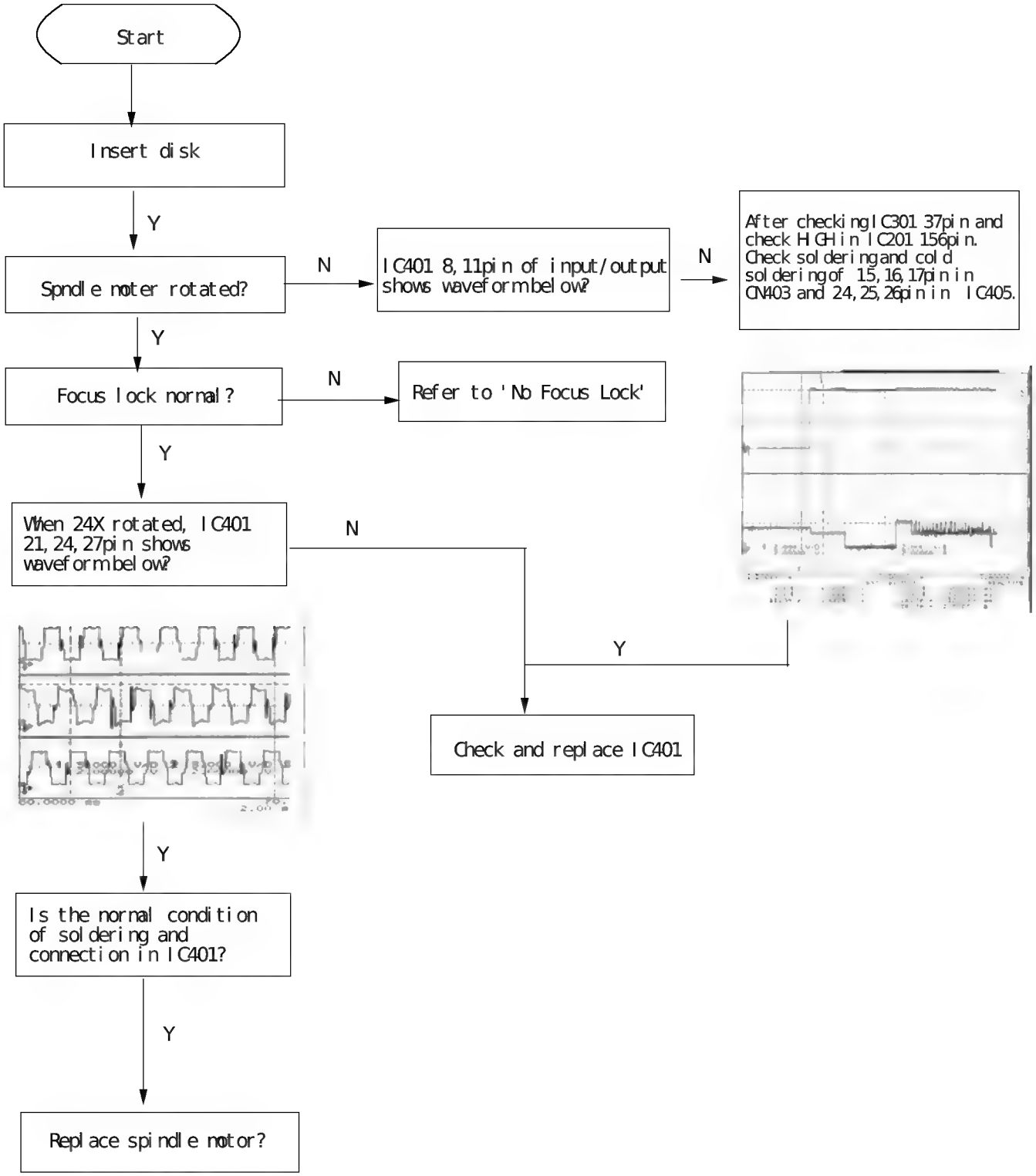
Replace LEAD SCREW and GEAR

Replace SLED MOTOR

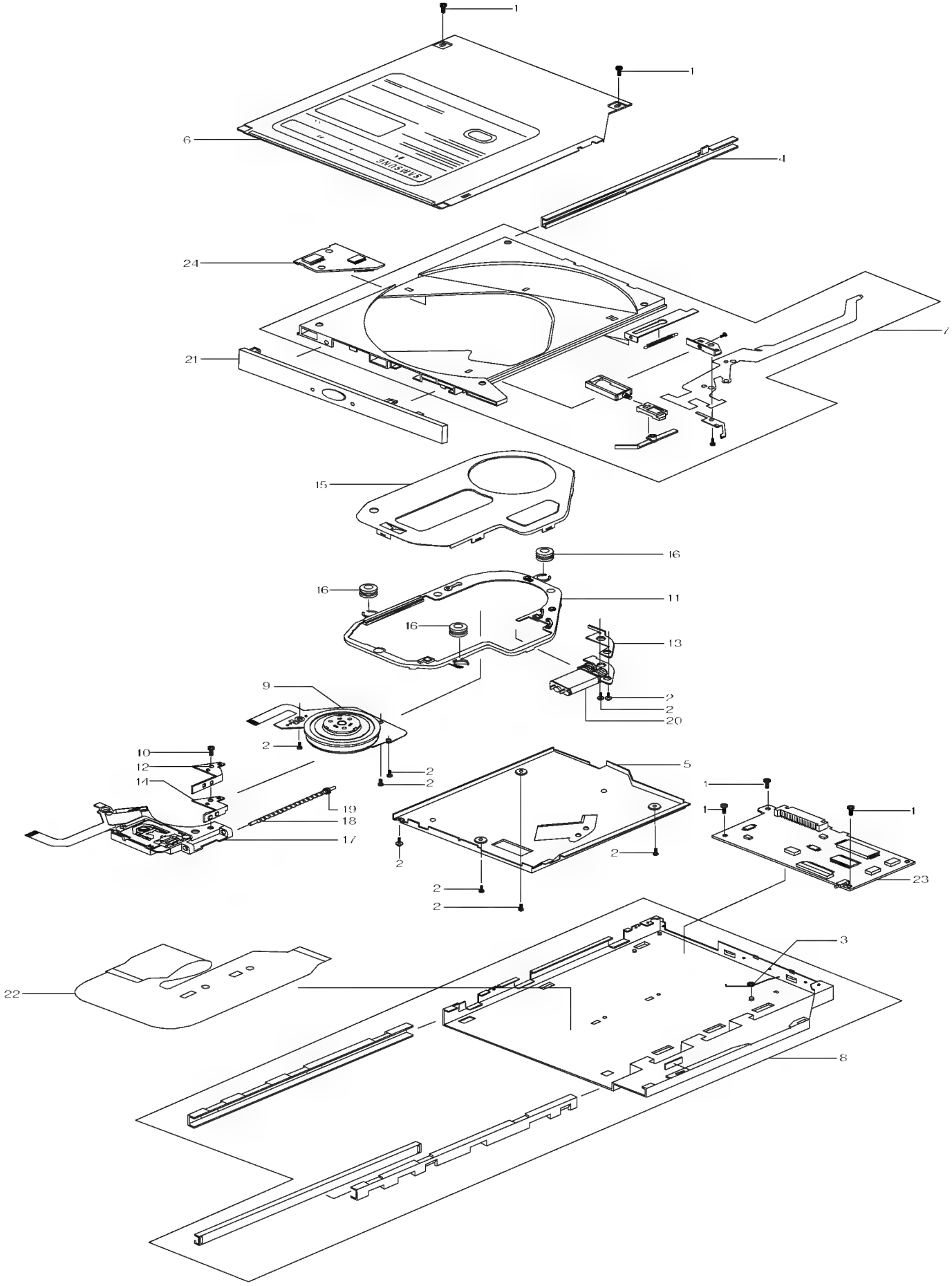
9-5. No Focus Lock



9-6. No Spindle Motor Rotation



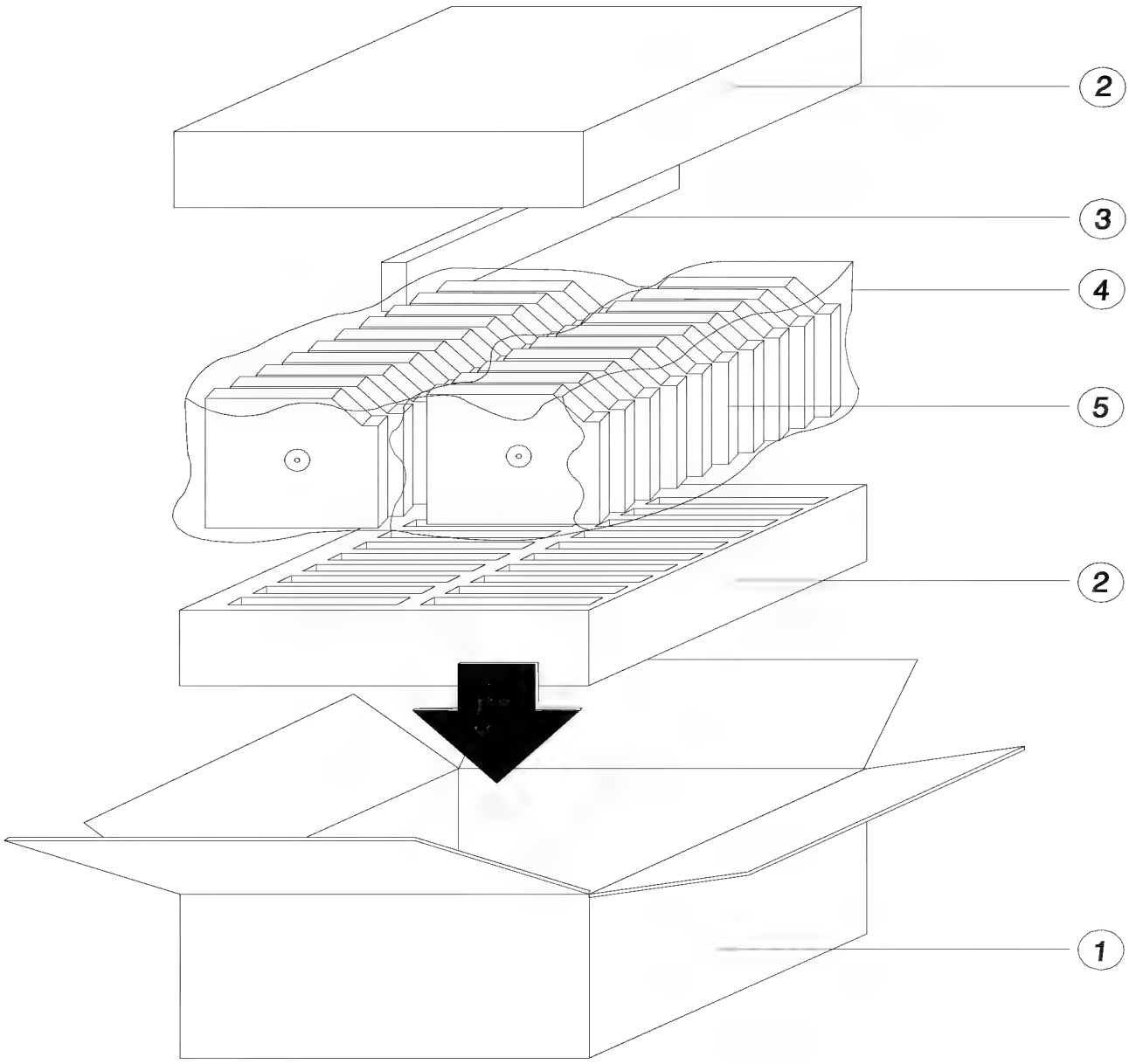
6. Disassembly Diagram



7. Device Parts List

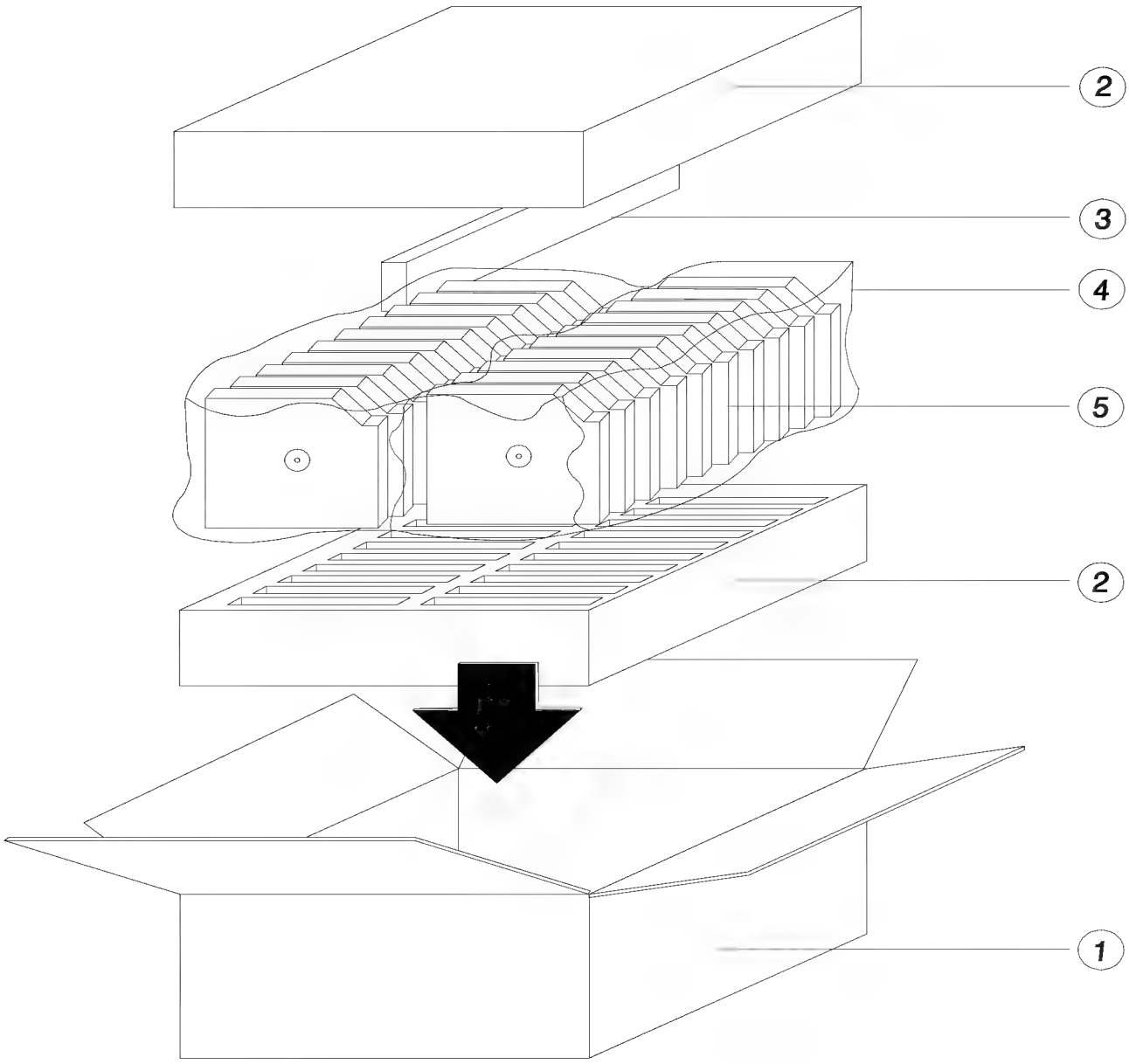
Part Position	Code No	Part Name & Specification
1	BG60-12001E	SCREW-MACHINE, PH+M1.7°ø2 Ni PLATING
2	BG60-12001G	SCREW-TAPPING, PH+•ı 1.7°ø4 Ni PLATING
3	BG61-60040A	SPRING-GND, SUS304WPB P0.5
4	BG61-72003A	RAIL LEFT, SUS430CP T0.5
5	BG63-30028A	COVER-DECK, SUS T0.3
6	BG64-30005A	CASE-TOP, SECC T0.5
7	BG98-12002J	ASS'Y-TRAY, TRAY+FPCB
8	BG98-12002L	ASS'Y CASE-BOTTOM, SECC+POM
9	BG31-12009A	MOTOR-SPINDLE, DC5V, 0.6A
10	BG60-12001U	SCREW-MACHINE, PH+M1.7°ø3 BLK
11	BG61-10028A	BRKT-DECK(M), SUS T0.8+POM
12	BG61-30017A	PLATE-SPRING GUIDE, SUS T0.15
13	BG61-30018A	PLATE-SPRING SHAFT, SUS T0.15
14	BG61-52001A	GUIDE-P/U, POM WHT
15	BG98-12003D	ASS'Y COVER P/U
16	BG69-20326A	CUSHION-RUBBER, 11R H4.8
17	BG95-50040A	ASS'Y PICK-UP, SANYO SF-U5000V
18	BG61-50029A	SHAFT LEAD-SCREW, SUS OD3 L69.5
19	BG66-20136A	GEAR-FEED, HYTREL7246 Z20 PCD5
20	BG98-12002X	ASS'Y FEED-MOTOR, MOTOR+BRKT_GEAR
21	BG98-11001F	ASS'Y PANEL FRONT, SCR-2437 COM
22	BG41-20050T	FPC-MAIN, POLYWIDE T0.1,40P, SCR-2438
23	BG93-10005K	ASS'Y MAIN PCB, SCR-2438/DOM, ASS'Y MAIN PC
24	BG93-10005L	ASS'Y-SUB PCB, SCR-2438/DOM

11. Packing Option



No	Code No	Part Name	Specification	Q'TY
1	BG69-40036A	MASTER CARTON		1/20
2	BG69-20320A	CUSHION-UP/DOWN	PE, H50, L288, W31	2/20
3	BG69-20321A	CUSHION-CENTER	PE, T16	1/20
4	BG69-30001A	BAG-PE SMALL	HDPE, T0.08, L150, W100, BLUE	20/20
5		SET	SCR-2438	20/20

11. Packing Option



No	Code No	Part Name	Specification	Q'TY
1	BG69-40036A	MASTER CARTON		1/20
2	BG69-20320A	CUSHION-UP/DOWN	PE, H50, L288, W31	2/20
3	BG69-20321A	CUSHION-CENTER	PE, T16	1/20
4	BG69-30001A	BAG-PE SMALL	HDPE, T0.08, L150, W100, BLUE	20/20
5		SET	SCR-2438	20/20

5.Electrical Parts List

CAPACITOR

LOCATION NO	CODE NO.	Part Name	SPEC	Q'TY
C101, C201, C204, C503, C504, C505, C506 C114, C409, C313	2203-000236	C-CERAMIC	100pF	10
C100, C104	2203-000041	C-CERAMIC	10pF	2
C209, C455, C456, C406, C407	2203-000062	C-CERAMIC	47nF	5
C212, C510, C102	2203-000257	C-CERAMIC	10nF	3
C202	2203-001222	C-CERAMIC	820pF	1
C205	2203-001211	C-CERAMIC	8.2nF	1
C207	2203-000715	C-CERAMIC	3.3nF	1
C108, C110, C115, C117	2203-000477	C-CERAMIC	1uF	4
C210, C405	2203-001607	C-CERAMIC	220pF	2
C208	2203-000357	C-CERAMIC	150pF	1
C211	2203-000925	C-CERAMIC	470nF	1
C302, C303	2203-001083	C-CERAMIC	5pF	2
C450, C451, C452, C453	2203-001052	C-CERAMIC	560pF	4
C501, C502, C112, C113	2203-000315	C-CERAMIC	120pF	4
C203, C206, C214, C215, C216, C217, C218 C219, C222, C223, C224, C226, C227, C228 C229, C301, C304, C311, C312, C314, C454 C457, C458, C542, CD63, C101, C103, C105 C106, C107, C109, C111, C116, C401, C402 C404, C408, C403	2203-000189	C-CERAMIC	100nF	38
C532, C534, CD01	2404-000112	C-TANTAL	100uF	3
C531, C540	2404-000304	C-TANTAL	22uF	2
C507, C508, C509, C225, C220, C221, C213 CE101, CE103, CE401, C305	2404-001001	C-TANTAL	10uF	11

IC

LOCATION NO	CODE NO.	Part Name	SPEC	Q'TY
IC305	0801-000791	CMOS, NAND	4S11	1
IC201	BG14-10001L	DSP, INTERFACE IC	OTI 9230	1
IC302	0801-002390	CMOS, FLIP-FLOP	74VHC374	1
IC301	0902-001165	MICROPROCESSOR	88C4404	1
IC403, IC101, IC103	1001-001003	ANALOG SWITCH	4S66	3
IC451	1003-001183	MOTOR DRIVER	BA5918FP	1
IC401	1003-001198	MOTOR DRIVER	AN8472SA	1
IC303	1107-001070	FLASH	29C512	1
IC402, IC103	1201-001002	OP AMP	2107	2
IC506, IC450	1201-000200	OP AMP	3414	2
IC503	1203-001394	VOL. DETECTOR	9735	1
ICD01	1203-001569	REGULATOR	XC62EP3902	1
ICD02	1203-001601	REGULATOR	XC62EP3302	1
IC101	1204-001434	RF CIRCUIT	CXA2571N	1

THERMISTOR

LOCATION NO	CODE NO.	Part Name	SPEC	Q'TY
TH01	1404-001127	THERMISTOR	100Khom	1

REGISTOR

LOCATION NO	CODE NO.	Part Name	SPEC	QTY
R135, R136, R302, R309, R131, R413	2007-000070	R-CHIP	0ohm	6
R555, R561, R568	2007-000071	R-CHIP	22ohm	3
R301	2007-000074	R-CHIP	100ohm	1
R415, R401	2007-000075	R-CHIP	220ohm	2
R515, R516	2007-000077	R-CHIP	470ohm	2
R137, R306, R407, R521, R522, R526, RD12, R12 R414, R122	2007-000078	R-CHIP	1Kohm	10
R551	2007-000081	R-CHIP	2.7Kohm	1
R208, R209, R113, R118	2007-000082	R-CHIP	3.3Kohm	4
R107	2007-000084	R-CHIP	4.7Kohm	1
R106	2007-00083	R-CHIP	3Kohm	1
R217, R452, R453, R456, R457, R460, R461	2007-00088	R-CHIP	7.5Kohm	7
R138, R207, R211, R214, R218, R305 R510, R519, R520, R525, R532, R533, RD10 R312, RD13, R116, RD19, R509, R121, R123 R403, R405, R408	2007-000090	R-CHIP	10Kohm	24
R408, R110, R112	2007-000092	R-CHIP	15Kohm	3
R454, R455, R127	2007-000093	R-CHIP	20Kohm	3
R210	2007-000094	R-CHIP	22Kohm	1
R316	2007-000096	R-CHIP	30Kohm	1
R132, R350, R449, R502, R504, R506, R508 RD9, RD20, R523	2007-000097	R-CHIP	47Kohm	10
R131, R212, R251, R517, R518, R119	2007-000102	R-CHIP	100Kohm	6
R201	2007-000103	R-CHIP	120Kohm	1
R204, R115, R125	2007-000105	R-CHIP	200Kohm	3
R203, R524	2007-000107	R-CHIP	470Kohm	2
R205	2007-000109	R-CHIP	1Mohm	1
R450, R451	2007-000127	R-CHIP	9.1Kohm	2
R556, R559, R560, R564	2007-000115	R-CHIP	82ohm	4
R202, R206, R250, R511, R513, R514 R407, R124	2007-000134	R-CHIP	33Kohm	9
RD21, RD8, R101	2007-000309	R-CHIP	10ohm	3
R108	2007-000329	R-CHIP	11Kohm	1
R402	2007-000402	R-CHIP	150ohm	1
R102, R103	2007-000458	R-CHIP	18Kohm	2
R406, R105, R114, R117	2007-000512	R-CHIP	2.4Kohm	4
R458, R459, R501, R503, R505, R507, R109, R111	2007-000655	R-CHIP	27Kohm	8
R404	2007-007268	R-CHIP	0.39ohm	1

R-NETWORK

LOCATION NO	CODE NO.	Part Name	SPEC	QTY
NR01, NR02, NR06, NR07	1022-00002	R-NETWORK	22 ohm	4
NR04, NR05	2011-001086	R-NETWORK	47Kohm	2
NR10	2011-001085	R-NETWORK	82ohm	1
NR03	2011-01011	R-NETWORK	10kohm	1

DIODE-ARRAY

LOCATION NO	CODE NO.	Part Name	SPEC	QTY
D101	0407-00115	DIODE-ARRAY	DAN202U	1

TRANSISTOR

LOCATION NO	CODE NO.	Part Name	SPEC	Q'TY
Q401, QD01, QD02	0501-000001	TR-SMALL	KTA1664	3
Q101	0501-000251	TR-SMALL SIGNAL	BC807	1
Q101, Q502, Q503, QD03	0501-000218	TR-SMALL SIGNAL	2SC4081	4
Q501	0501-000162	TR-SMALL SIGNAL	2SA1576	1
Q102, Q103, Q104	0504-000105	TR-DIGITAL	DAT114EU	3

RESONATOR

LOCATION NO	CODE NO.	Part Name	SPEC	Q'TY
X201	2802-001045	RESONATOR	33.86MHz	1
X301	2802-001068	RESONATOR	20MHz	1

INDOCTOR

LOCATION NO	CODE NO.	Part Name	SPEC	Q'TY
L501, L101	2703-000398	INDUCTOR-SMD	10uH	2

CONNECTOR

LOCATION NO	CODE NO.	Part Name	SPEC	Q'TY
CN101	3708-000519	FPC/FC/PIC	18P	1
CN401	3708-001300	FPC/FC/PIC	16P	1
CN402	3708-001301	FPC/FC/PIC	10P	1
CN403, CN405	3708-001331	FPC/FC/PIC	40P	2
CN500	3711-003521	HEADER	50P	1

SWITCH

LOCATION NO	CODE NO.	Part Name	SPEC	Q'TY
	BG34-22001B	SWITCH-TACT	DC12V	1
SW801	3403-000126	SWITCH-PUSH	SPVC2-1	1

FPC

LOCATION NO	CODE NO.	Part Name	SPEC	Q'TY
FPC	BG41-20050T	FPC	40P	1
FPC	BG41-20050U	FPC-SUB	10P	1

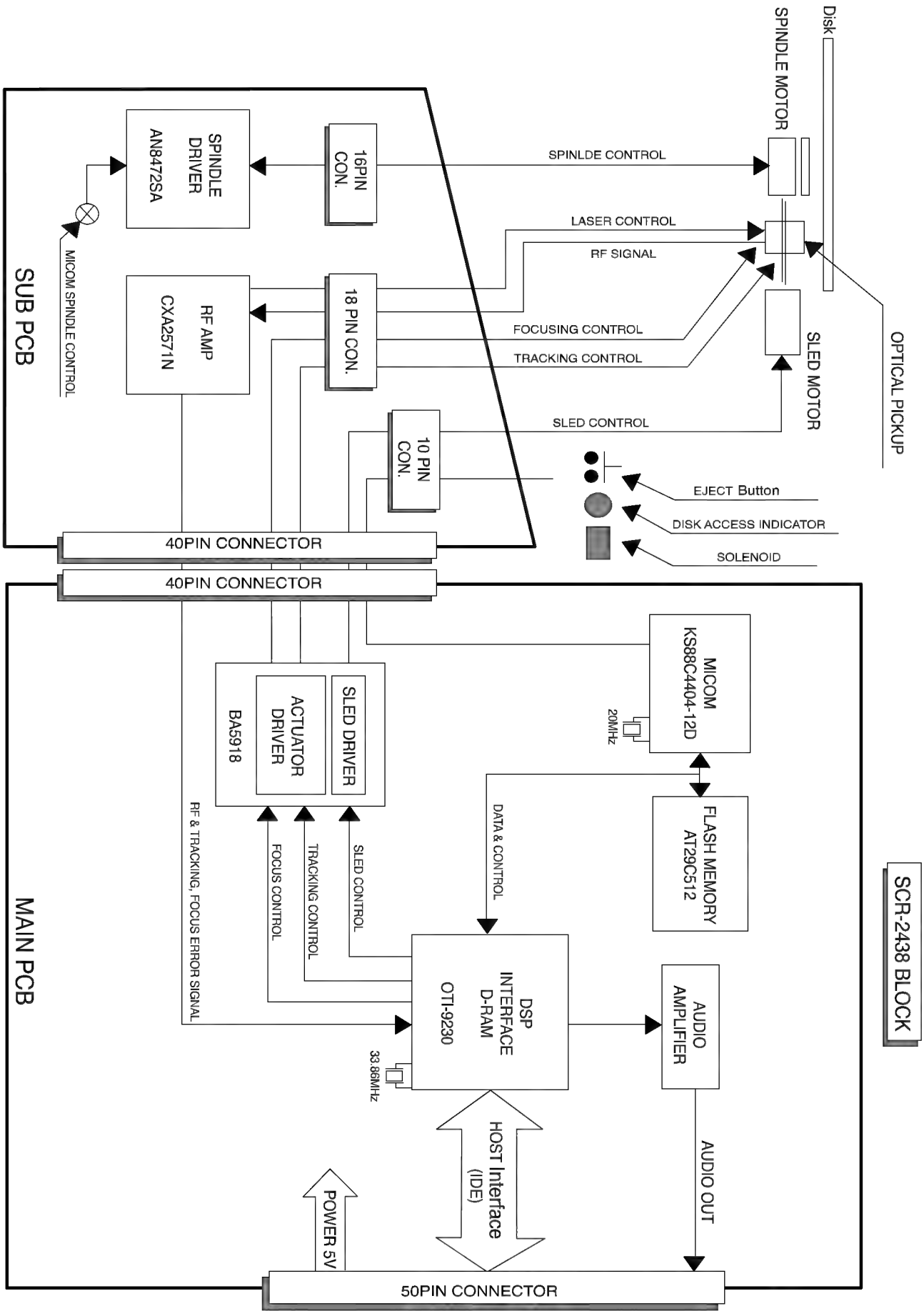
LED

LOCATION NO	CODE NO.	Part Name	SPEC	Q'TY
	0601-001006	LED	Y-GRN	1

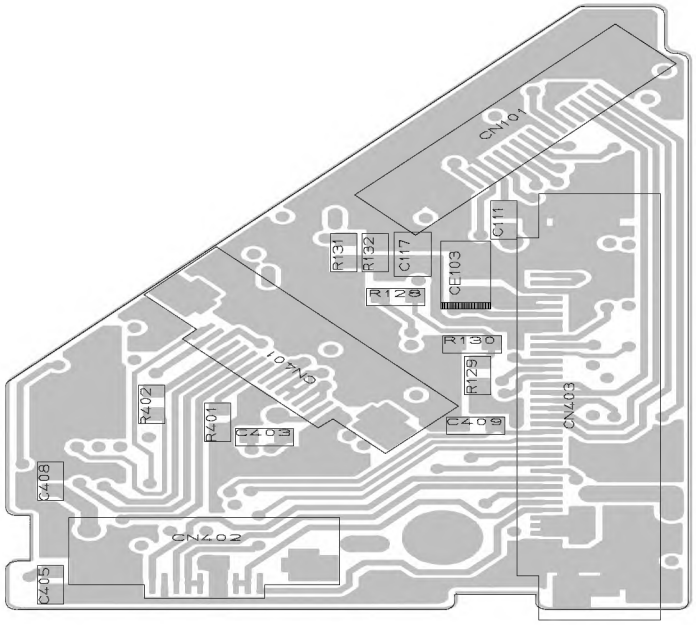
P.C.B

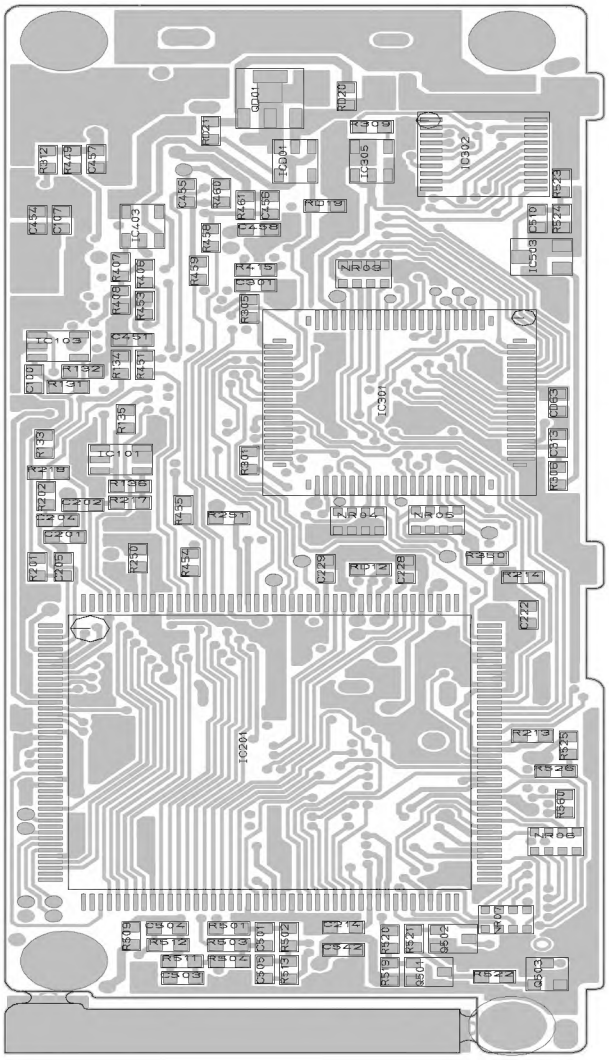
LOCATION NO	CODE NO.	Part Name	SPEC	Q'TY
P.C.B	BG41-10080A	PCB-MAIN	SCR-2438	1
P.C.B	BG41-10081A	PCB-SUB	SCR-2438	1

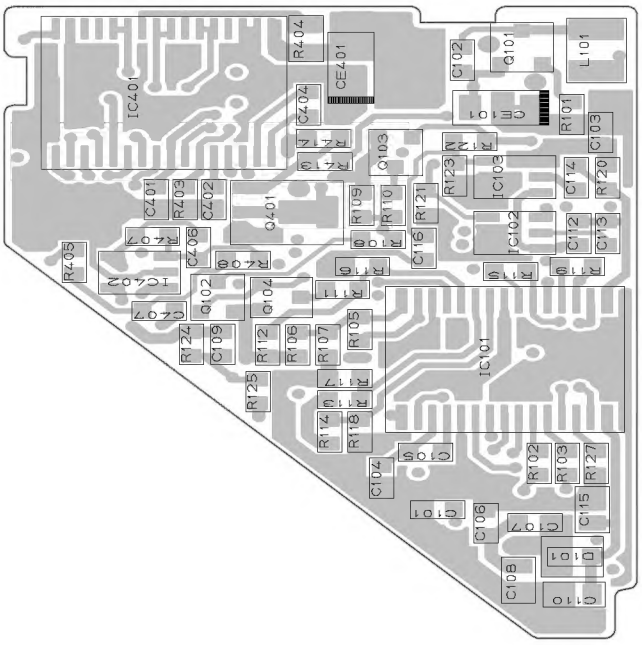
10. Block Diagram

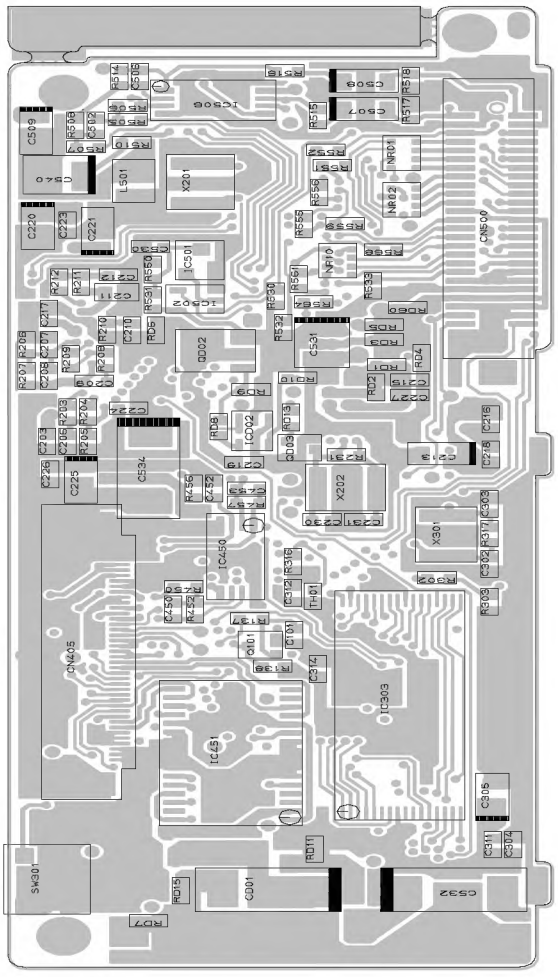


12. Main Board

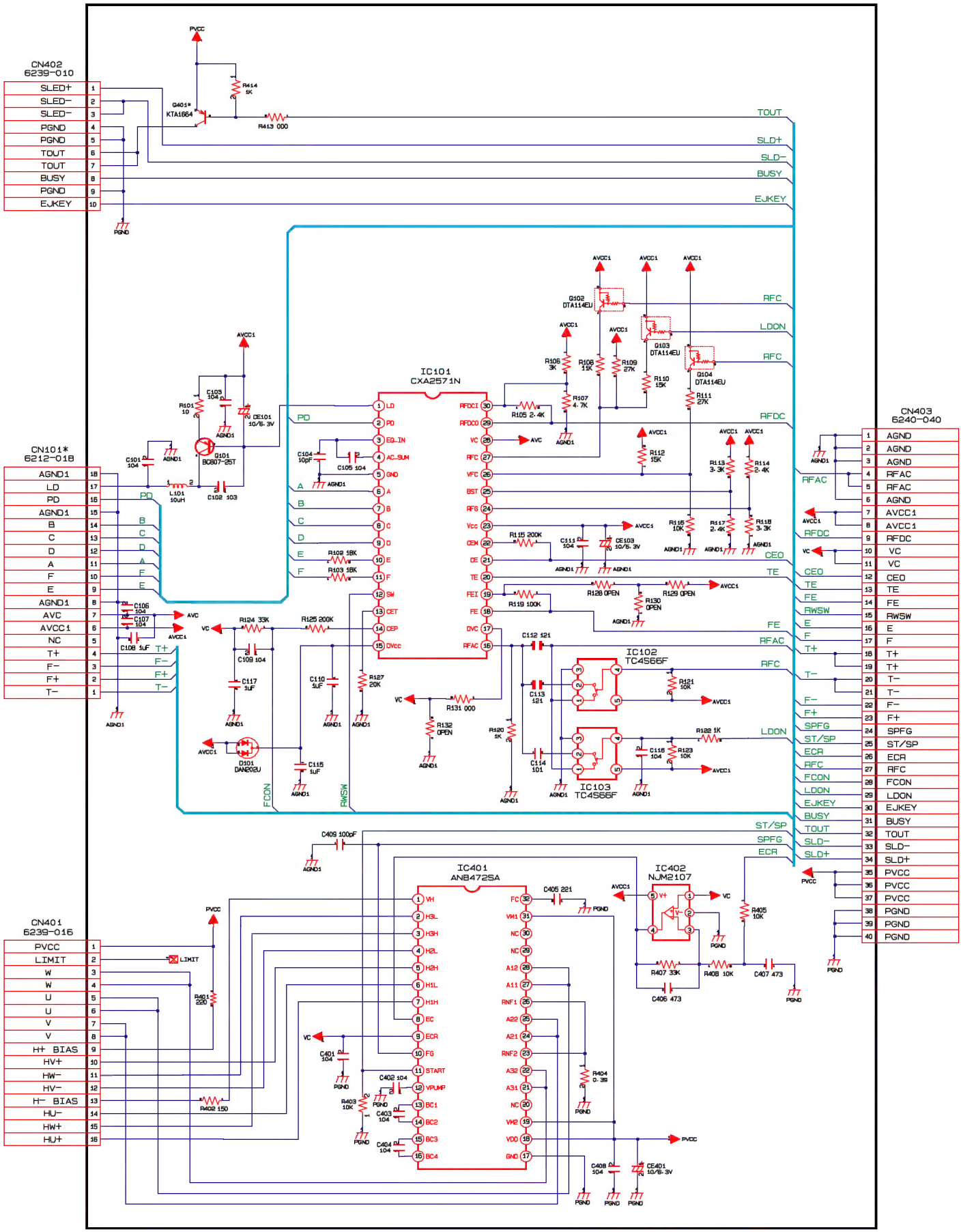


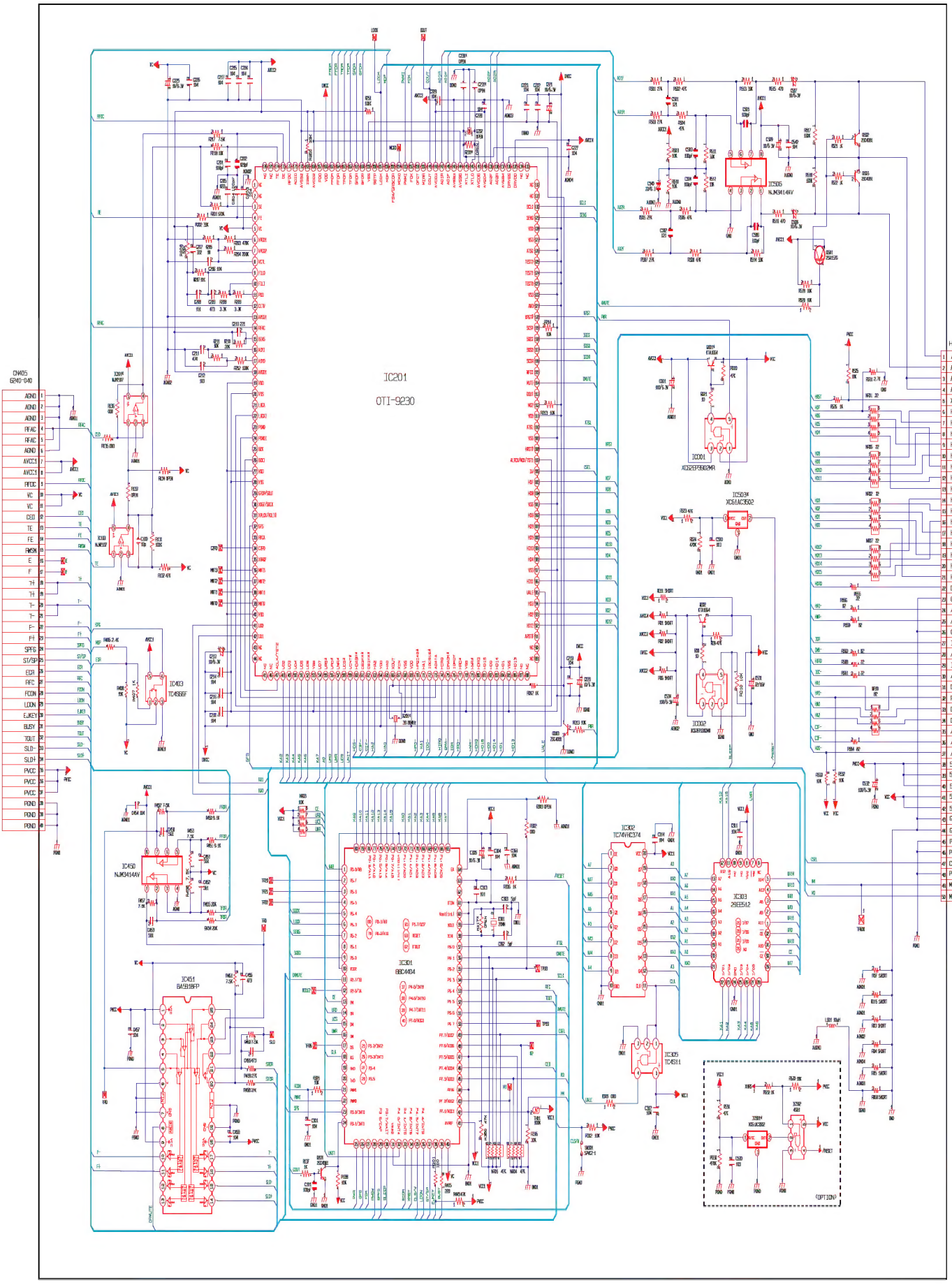






13. Circuit Diagram




IC201
OTI-9230
CN405
CN600
HEADER-BOX-SIP
IC1001
IC1002
IC1003
IC1004
IC1005
IC1006
IC1007
IC1008
IC1009
IC1010
IC1011
IC1012
IC1013
IC1014
IC1015
IC1016
IC1017
IC1018
IC1019
IC1020
IC1021
IC1022
IC1023
IC1024
IC1025
IC1026
IC1027
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IC1033
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IC1035
IC1036
IC1037
IC1038
IC1039
IC1040